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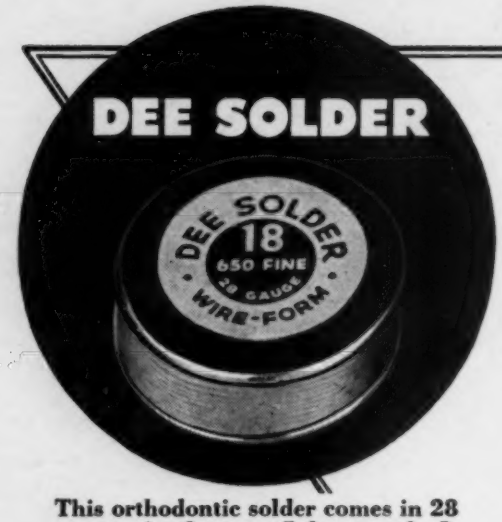

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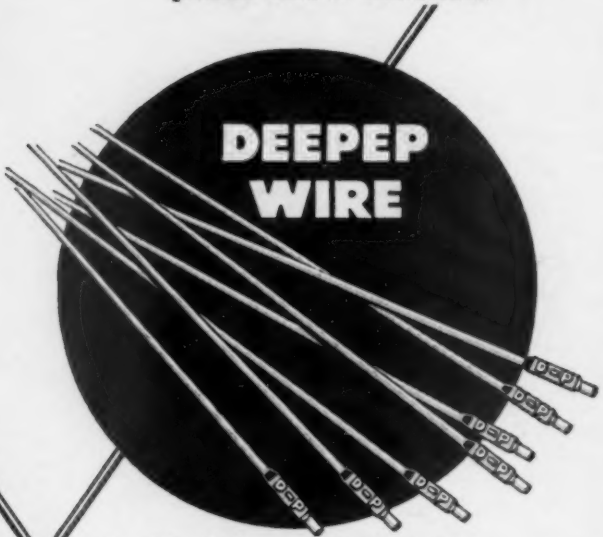

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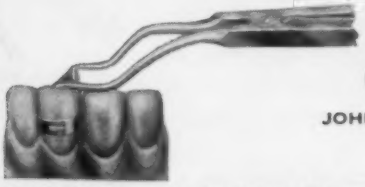

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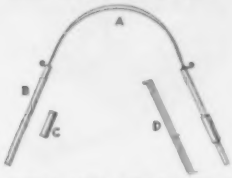

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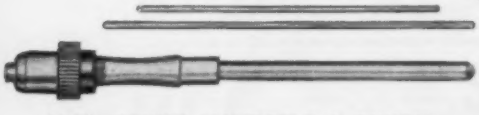

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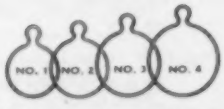

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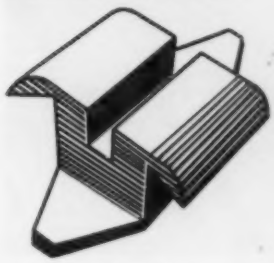

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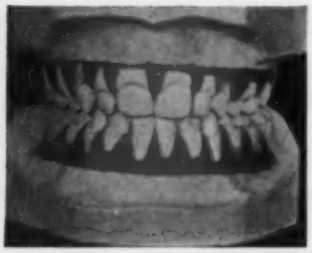

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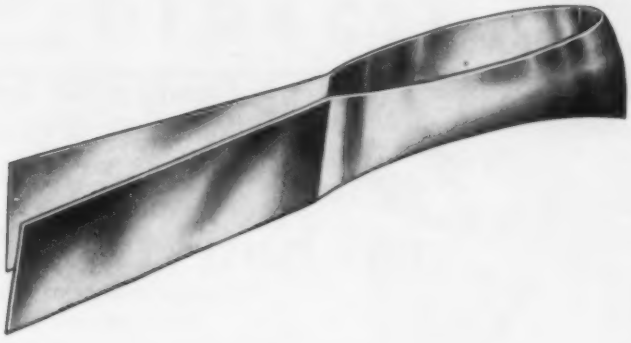

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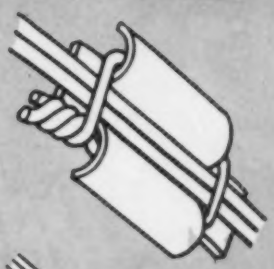

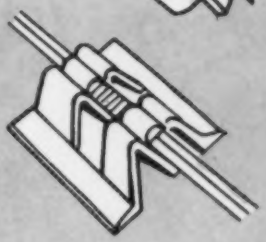

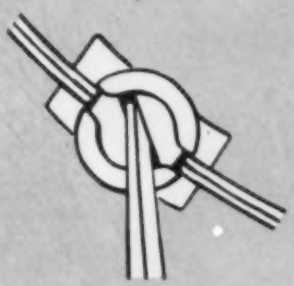

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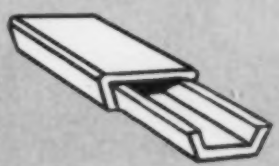

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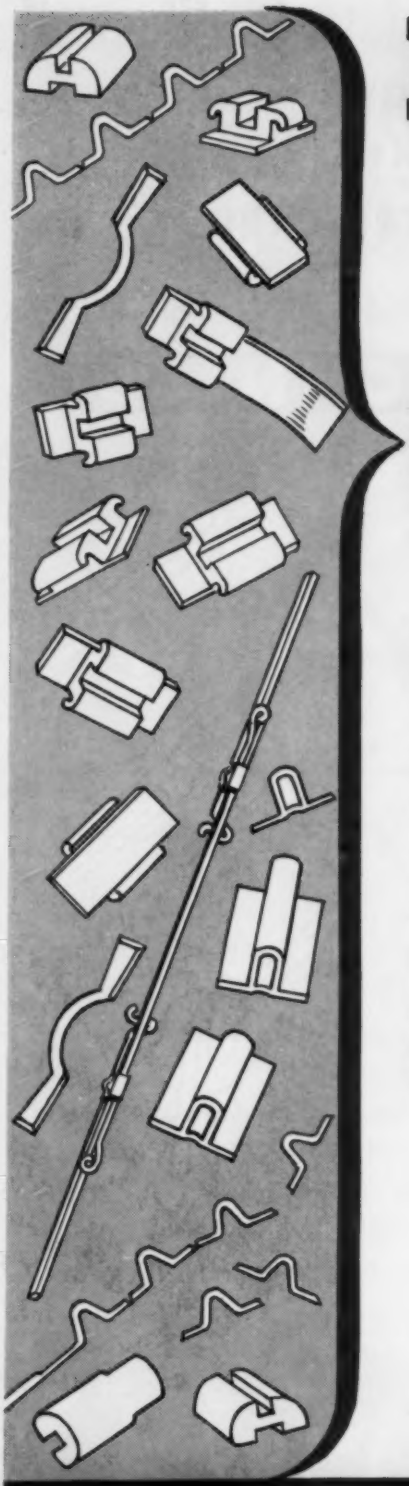

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VOL. 38 SEPTEMBER, 1952 No. 9

Original Articles

DENTO-CRANIOFACIAL RELATIONS IN VARYING DEGREES OF OVERBITE

PREM PRAKASH, B.D.S., M.S.,* AND HERBERT I. MARGOLIS, D.M.D.,**
BOSTON, MASS.

INTRODUCTION

OVERBITE has been defined as the "overlapping of the upper and lower central incisors in the vertical plane."[46] Overbite varies in extent in different individuals; when excessive it creates a clinical problem of considerable interest and concern. The border line between the so-called normal and abnormal overbite, however, remains to be clearly defined.[1]

Certain aspects of overbite in the human dentition have been dealt with in the past. Anthropologic studies have revealed that the incisors in primitive man occluded edge to edge. Vertical "overlap" became a common feature of the human dentition at about the era of the Saxons, nearly two thousand years ago.[2, 3]

Clinical studies have established that the extent of overbite often varies with changes in dentition associated with age.[4, 5] It is also well known that following extraction of teeth, drifting of adjacent teeth and other changes in dental alignment occur, frequently resulting in an increase of overbite.[6] Clinical surveys have also brought to light the prevalence of excessive overbite in modern man, in both the temporary and permanent dentitions.[3, 6]

Excessive overbite is one of the most common problems that confront the orthodontist.[7] It may interfere with ability to occlude the teeth properly,[8] which in turn may result in postnormal position of the mandible when the opposing arches are in occlusion. Once this relation is established, proper functions of the mandible, tongue, and adjacent structures are inhibited.[3, 9, 10] Also complications caused by excessive overbite in the treatment of many diverse and varied forms of malocclusion and the problems of retention after its correction have been repeatedly emphasized in the literature.[11, 12, 13, 14]

Presented at the Fiftieth Annual Meeting of the American Association of Orthodontists, at Louisville, Ky., April 23-26, 1951.

*Instructor in Anatomy, Tufts College Medical and Dental Schools.
**Professor of Orthodontics, Tufts College Dental School.

Overbite, when excessive, has also been assumed to be a causative factor in periodontal disease,[1, 3, 15] and various other ailments, local and general: discomfort, headache, fatigue, mild catarrhal effects, tinnitus, pain about the temporal regions, migraine, paresthesia in the mouth and pharynx, tenderness of the mandibular joint, mandibular subluxation, ineffective mastication, defective hearing, and changes in the facial expression.[16, 17, 18, 19, 20] However, there is a wide range of opinions on this subject.[25]

Injury to dental investing tissues attributed to excessive overbite and its importance in successful orthodontic therapy prompt the clinician to search for the remedy. A thorough comprehension of the nature and site of the anomaly is essential,[34] to determine the choice of therapy and to establish the prognosis.

REVIEW OF THE LITERATURE

On the basis of clinical observations some authorities have stated that excessive overbite is an indication of incorrect curves of Spee which they state may be due to:

1. Supraclusion of the maxillary and/or mandibular incisors.
2. Infraclusion of the maxillary and/or mandibular posterior teeth.
3. Any combination of the anomalies just mentioned.

The literature is replete with the expressed opinions of experienced clinicians but further study is warranted to determine whether the theorized supraclusion of anterior teeth and/or infraclusion of posterior teeth is a significant factor determining the extent of overbite. Further, the relative significance of each of these factors is widely disputed:

Infraclusion of posterior teeth as the cause of excessive overbite has been suggested by Howes,[35] Rogers,[13] Chapman,[36] Dunn,[12] and Gray.[28]

Supraclusion of anterior teeth, maxillary and mandibular, as the cause has been favored by A. F. Jackson[8] and V. H. Jackson,[29] while Wolfson[23] and Neustadt[26] stated that supraclusion of mandibular incisors only is responsible for excessive overbite.

Strang,[1] Steadman,[21] Mershon,[24] Howard,[27] and Sved[30] are of the opinion that all these factors (supraclusion of anterior teeth and infraclusion of posterior teeth, maxillary and mandibular) contribute to the condition.

Most of these opinions are based principally upon analyses of plaster casts which indicate nothing more than the relations of teeth to one another. It is important to note that the curves of Spee as visualized from unorientated plaster casts are a measure only of the relative positions of the anterior to the posterior teeth (Fig. 1).

Mershon,[24] following C. Clinton Howard's premise,[27] divided excessive overbite cases into two types:

1. "Deep overbite": Dentitions presenting exaggerated curve of Spee due to an apparent overeruption of the lower anterior teeth. The posterior teeth in this category are long and have deep cusps.

2. "True closed bite": Dentitions presenting infraclusion of posterior teeth permitting overclosure of the mandible. The posterior teeth are short and broad, thus reducing the distance between the maxilla and the mandible. As a result the distance from the nose to the chin is in dysharmony with the generally accepted concept of the ideal face.

The meager data, and varying opinions, based on personal observations and impressions, are inadequate for a scientific appraisal.

For analysis of a problem such as this, statistical techniques[50, 51] are invaluable and inevitable. However, it should be emphasized that factors which do not show any statistical significance for the group may still be operative in isolated cases.

OBJECTIVES OF THIS STUDY

1. To determine if any significant over-all differences exist in vertical elevation of teeth in excessive overbite, when compared with dentitions not exhibiting this anomaly. If statistically significant differences are found, then,

2. To determine the extent of correlation between the vertical level of teeth and the amount of overbite. If the correlation is statistically significant,

3. To determine whether excessive overbite is a manifestation of supraclusion of maxillary or mandibular incisors, or infraclusion of maxillary or mandibular posterior teeth, or a combination of these factors.

MATERIAL

In order to prevent the study from becoming too prolix which would result from a mass of unassortable heterogenous sample, the material for this study consisted of standardized sagittal roentgen cephalograms of 120 white individuals between the ages of 12 and 30 years, presenting a full complement of permanent teeth in occlusion (not considering third molars), and falling within the range of normal vertical craniofacial growth and development.[37] With the use of Margolis' cephalostat, the necessity for resorting to conversion scales was eliminated.[38]

The distribution of cases according to occlusion was as follows (Table I):

1. "Normal dentitions"(36): Dentitions which, apart from the presence of excessive overbite in some cases, did not require orthodontic treatment.

2. Angle Class I malocclusions (44).

3. Angle Class II malocclusions (40).

No Class III malocclusions were included in this study.

METHODS

A review of the literature reveals a wide diversity of opinions in the mode of expressing overbite quantitatively. The usual method of expressing variations as "slight," "marked," or "excessive" is obviously vague and inadequate.[4]

Strang[1] and Wylie[31] measured overbite in terms of the extent of palatal surface of the maxillary central incisor covering the mandibular central incisor (Fig. 2). This method though useful clinically is not correct scientifically.

Labial inclination of the maxillary incisors will affect the measurement of overbite without any actual change in the amount of "vertical overlap" of the incisors (Fig. 3).

Neff[32] reversed this method and measured overbite in terms of the extent of the mandibular central incisor covered by the maxillary central incisor. The same objection applied to this method though perhaps to a lesser degree because of the relative infrequency of cases presenting severe labial inclination of the mandibular incisors.

A somewhat more accurate method of measuring overbite was devised by Goldstein and Stanton[4]: "The casts are placed on the leveling table of Stanton pantograph[33] and orientated in the occlusal plane. A sliding pointer on an elevation scale gives the heights to the incisal edges of the maxillary and mandibular central incisors," the difference between the two heights representing the amount of overbite. In this method the pointer is parallel to the occlusal plane; any change in the angulation of the occlusal plane will cause a change in the angulation of the pointer. If the overjet is appreciable, a change in the reading on the scale will result even though the relationship between the maxillary and mandibular incisors remains unchanged (Fig. 4).

A new method for measuring overbite was devised eliminating the objections of previous methods (described later in this paper).

In order to measure vertical levels of teeth in the craniofacial anatomy it is necessary to relate them to a line or plane of reference. The following planes were used in this study and were obtained from sagittal roentgen cephalograms.

1. Mandibular plane: Mandibular teeth were related to this plane.
2. Nasion-sella turcica line (N-S line): Maxillary teeth were related to this line.

Similar planes have been used by other investigators for observing changes in the vertical relationship of teeth during orthodontic treatment.[43] First molars were selected to study the vertical level of the posterior teeth, because a slight deviation in this region would have a greater influence on overbite than the same amount of change in the premolar region.[44]

The vertical level of teeth in the craniofacial anatomy was determined by the length of perpendiculars to the respective planes from the incisal edges of the central incisors and the middle (anteroposteriorly) of the occlusal surfaces of the first molars, maxillary and mandibular. The length of these perpendiculars relates these teeth to the planes in the vertical dimension.

Using thin tracing paper and a sharp pencil, the following data were recorded from each cephalogram (Fig. 5):

1. Lower incisal height: A line drawn from the incisal edge of the mandibular central incisor meeting the mandibular plane at right angles.
2. Lower molar height: A line drawn from the middle (anteroposteriorly) of the occlusal surface of the mandibular first molar meeting the mandibular plane at right angles.
3. Upper incisal height: A line drawn from the incisal edge of the maxillary central incisor meeting the N-S line at right angles.

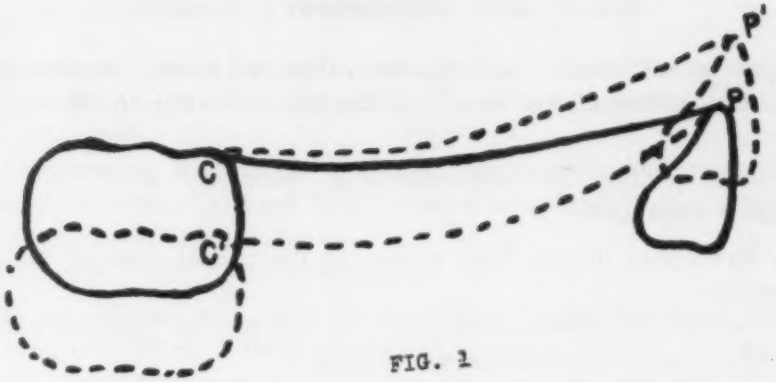

FIG. 1

FIG. 2

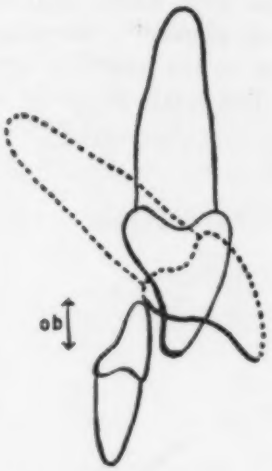

FIG. 3

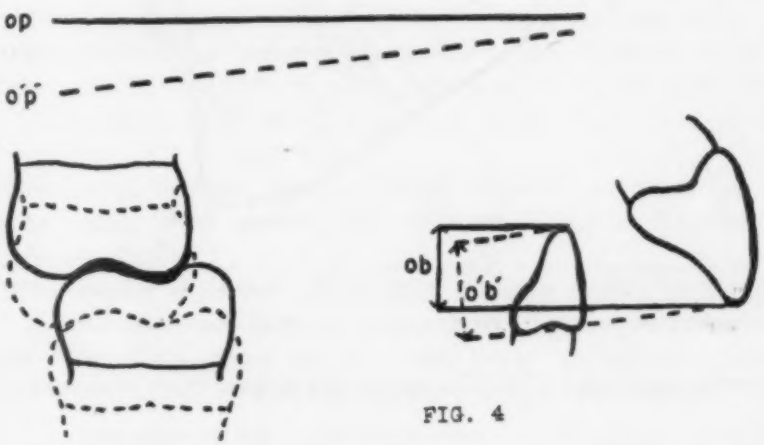

FIG. 4

Fig. 1.—"Normal" curve of Spee (*CP*). Exaggerated curve of Spee (*CP'*) due to supraclusion of incisors. Exaggerated curve of Spee (*C'P*) due to infraclusion of posterior teeth. Note the identical forms of the curves of Spee, *CP'* and *C'P*.

Fig. 2.—Wylie's method of measuring overbite.

Fig. 3.—The amount of vertical overbite in both cases is the same (*ob*), but using Wylie's method the overbite in the case of labially inclined upper incisor is greater because of the influence of overjet.

Fig. 4.—Goldstein and Stanton's method of measuring overbite. Note the change in the measurement of overbite (*ob*) due to a change in the angulation of the occlusal plane (*op*) without any change in the vertical relationship of upper and lower incisors.

4. Upper molar height: A line drawn from the middle (anteroposteriorly) of the occlusal surface of the maxillary first molar meeting the N-S line at right angles.

To check further the relationship of maxillary teeth, two additional measurements were used:

5. A line (N-I) drawn from nasion to the incisal edge of the maxillary central incisor.

6. A line (N-M) drawn from nasion to the middle (anteroposteriorly) of the occlusal surface of the maxillary first molar.

It has been shown that normally the latter two measurements approximate each other closely[45]; therefore a change from this relationship would indicate a change in the relative vertical levels of maxillary central incisor and first molar. The small range of variations of the angle (I-N-M) in this series does not affect this observation.

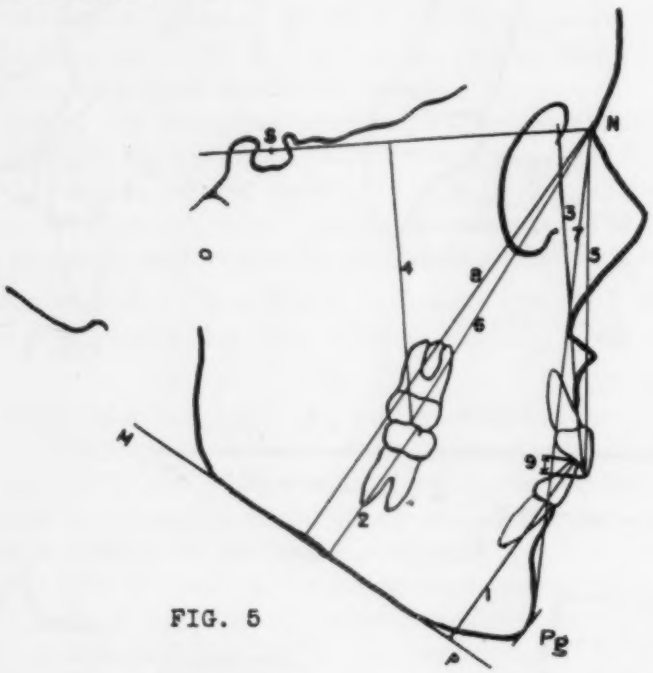

FIG. 5

Fig. 5.—The measurements used in this study: *1*, Lower incisal height. *2*, Lower molar height. *3*, Upper incisal height. *4*, Upper molar height. *5*, N-I. *6*, N-M. *7*, "Anterior face height." *8*, "Perpendicular face height." *9*, Overbite.
N-S, Nasion-sella turcica line; *N-Pg*, facial line; *M-P*, mandibular plane.

7. "Anterior face height": The facial line drawn from nasion to pogonion (Pg).

8. "Perpendicular face height": A line drawn from nasion meeting the mandibular plane at right angles.

9. Overbite: Perpendiculars were drawn to the facial line (N-Pg) from the incisal edges of the maxillary and mandibular central incisors. The length of the facial line between the points of intersection by these perpendiculars rep-

resents the amount of overbite. The variations of facial line in the types of cases under study are so little[37] that the effect on the measurement of overbite can be safely ignored.

All measurements, with the exception of face heights, were recorded to the nearest half millimeter, the face heights being measured to the nearest millimeter (Tables IIA and IIB).

FINDINGS

I. First an attempt was made to determine if any significant differences exist in the vertical level of teeth in cases of excessive overbite as compared to cases not exhibiting this anomaly. For this purpose the cases were grouped as follows:

1. Cases presenting slight overbite—not exceeding 2 mm.
2. Cases presenting medium overbite—from 2.5 to 6.5 mm.
3. Cases presenting excessive overbite—7 mm. and over.

The distribution of cases according to this grouping is shown in Table I.

TABLE I. DISTRIBUTION OF CASES ACCORDING TO THE TYPE OF OCCLUSION AND THE DEGREE OF OVERBITE

		SLIGHT OVERBITE	MEDIUM OVERBITE	SEVERE OVERBITE
Entire group	120	18	80	22
"Normal" occlusion	36	6	29	1
Class I malocclusion	44	10	26	8
Class II malocclusion	40	2	25	13

To show the total effect of changes in the relative vertical levels of the anterior and posterior teeth, the incisal height measurements (upper and lower) were expressed as percentages of molar height measurements (upper and lower, respectively) for each case. Means and standard deviations of these upper and lower "ratios" were computed for the three groups (Table III). There is a very significant difference between the means of this ratio for slight and severe overbite groups (Table IV). No attempt was made to interpret the difference between the medium overbite as compared to the slight and severe overbite groups.

Application of this test to the different types of occlusion was statistically unsatisfactory due to the small number of cases falling in the slight and severe overbite groups (Table I).

II. The second objective was to determine the degree of association (correlation) between the variations in the vertical levels of teeth and the amount of overbite. For this purpose the upper and lower "ratios" were correlated with the amount of overbite. This yielded strong positive correlations*:

Correlation of upper ratio to overbite	+0.54
Correlation of lower ratio to overbite	+0.40
Multiple (total) correlation	+0.65

These correlations were then computed for each of the three types of cases, according to occlusion. There were no statistically significant differences

*Standard error of correlation, 0.09. A correlation is significant if it is 2.6 times its standard error.

TABLE IIA. THE DATA*

NO.	AGE (YEARS)	OVER-BITE	ANTE-RIOR FACE HEIGHT	PERPEN-DICULAR FACE HEIGHT	LOWER INCISAL HEIGHT	LOWER MOLAR HEIGHT	UPPER INCISAL HEIGHT	UPPER MOLAR HEIGHT	N-I	N-M	CLASS
1.	12	4.5	107	107	42.0	33.5	79.0	65.0	79.0	73.0	I
2.	17	3.0	106	107	41.0	31.0	74.0	65.5	74.0	76.5	I
3.	12	5.0	108	108	44.5	31.0	79.0	65.5	79.0	77.0	I
4.	13	7.0	106	108	42.5	32.0	79.5	65.5	79.5	76.0	II
5.	13	7.5	108	109	42.0	29.5	79.0	63.0	81.0	78.5	II
6.	13	5.0	109	109	43.0	30.0	78.0	66.5	78.5	78.5	II
7.	13	2.5	109	109	41.5	30.5	78.0	65.0	78.5	78.0	I
8.	15	2.5	108	109	44.5	30.0	76.5	70.0	76.5	78.5	I
9.	12	2.0	113	110	41.0	31.0	79.0	65.5	79.0	79.0	I
10.	14	4.5	108	110	40.0	30.0	78.0	66.5	79.0	79.0	I
11.	13	5.0	112	110	41.0	28.0	78.5	65.0	80.0	80.0	II
12.	12	1.0	110	110	44.0	35.0	78.0	67.0	78.0	75.0	II
13.	15	5.0	108	110	48.0	32.5	74.0	68.0	74.0	76.5	II
14.	13	6.0	116	110	42.0	30.0	80.0	67.5	80.0	80.0	II
15.	13	6.0	111	111	45.0	31.0	79.0	67.0	80.0	80.0	II
16.	12	6.0	109	111	43.0	31.0	80.0	67.0	80.0	80.0	II
17.	14	3.0	115	111	43.5	32.0	79.5	70.5	79.5	78.5	II
18.	13	7.5	109	111	43.0	30.0	79.5	68.5	80.5	81.0	I
19.	14	0.0	112	111	43.5	33.5	77.0	65.5	77.0	78.0	I
20.	13	5.0	110	111	41.0	30.5	79.5	66.0	81.0	80.0	I
21.	13	0.0	116	112	44.0	32.5	80.0	69.5	80.5	80.0	I
22.	12	3.5	113	112	45.0	32.5	79.5	68.0	79.5	80.0	I
23.	13	5.5	115	112	43.0	28.0	83.0	69.0	84.5	84.5	II
24.	13	6.0	114	112	41.0	28.5	83.0	67.5	84.0	83.0	II
25.	21	4.5	116	112	44.5	32.0	82.5	71.0	83.0	81.0	N
26.	20	3.5	109	112	44.0	34.0	77.5	69.0	77.5	78.0	N
27.	19	2.5	115	112	44.0	32.0	80.0	69.0	81.0	81.5	N
28.	25	3.5	116	113	43.0	32.5	81.0	70.0	82.5	81.0	N
29.	14	5.5	119	113	45.0	33.5	83.5	67.0	84.5	81.0	N
30.	13	8.0	114	113	44.0	31.0	84.0	69.0	84.0	81.5	II
31.	14	7.0	112	113	41.0	31.0	82.5	68.0	84.0	82.5	I
32.	13	4.5	113	113	42.0	32.0	82.5	66.5	83.0	81.0	I
33.	13	5.5	115	114	41.5	32.0	82.0	66.5	84.0	81.5	I
34.	13	5.5	116	114	45.0	34.0	85.0	69.0	86.0	81.0	I
35.	12	4.0	114	114	41.5	32.0	82.0	68.5	82.5	82.0	II
36.	14	7.0	113	114	43.0	32.5	79.0	67.0	80.0	81.0	II
37.	15	5.0	118	114	47.5	32.5	84.0	70.5	84.5	81.5	II
38.	18	3.0	116	115	47.0	34.0	80.5	72.0	80.5	80.0	II
39.	16	6.0	117	115	44.5	30.0	86.0	70.5	87.0	84.5	II
40.	14	2.0	118	115	44.0	32.0	81.5	73.5	82.0	84.0	I
41.	13	2.5	119	115	45.5	35.0	82.5	68.0	82.5	80.5	I
42.	14	2.0	124	115	46.5	34.0	85.5	78.5	85.5	84.5	I
43.	15	4.0	112	116	46.5	34.0	86.0	70.0	84.0	84.0	I
44.	13	5.5	118	116	48.0	32.5	84.0	74.0	84.5	83.5	I
45.	13	5.0	118	116	45.0	33.5	86.0	67.5	86.5	82.5	I
46.	23	7.0	115	116	44.0	32.5	84.0	67.0	85.0	82.5	I
47.	17	7.0	117	116	42.5	30.0	86.0	69.0	88.0	86.0	II
48.	20	4.0	118	116	46.5	34.0	84.0	76.0	84.5	84.0	N
49.	19	2.5	116	116	48.5	36.5	81.0	71.5	81.0	80.5	N
50.	14	7.0	119	117	47.0	34.5	87.0	71.0	87.5	84.0	I
51.	13	4.5	121	117	40.5	31.5	87.0	72.5	88.0	85.5	I
52.	12	5.0	117	117	46.0	34.0	84.0	70.0	85.0	83.5	I
53.	13	6.0	119	117	47.5	31.5	86.5	76.5	87.0	86.0	I
54.	13	13.0	117	117	45.5	31.5	87.5	72.0	88.5	85.5	I
55.	14	5.0	114	117	46.5	31.0	84.0	70.5	86.0	87.5	II
56.	13	6.0	121	118	48.5	34.5	87.0	72.0	87.5	84.0	II
57.	16	3.0	116	118	47.0	36.5	82.0	69.5	82.5	82.0	II
58.	12	7.0	118	118	45.0	33.5	84.0	67.0	86.0	84.0	II
59.	21	2.0	128	118	48.0	35.5	88.0	74.0	89.0	86.5	I
60.	14	7.0	123	118	50.0	39.0	87.5	70.0	88.0	80.0	I
61.	13	5.0	121	119	48.5	35.0	85.0	74.0	85.0	84.5	I

TABLE IIA.—CONT'D

NO.	AGE (YEARS)	OVER-BITE	ANTE-RIOR FACE HEIGHT	PERPEN-DICULAR FACE HEIGHT	LOWER INCISAL HEIGHT	LOWER MOLAR HEIGHT	UPPER INCISAL HEIGHT	UPPER MOLAR HEIGHT	N-I	N-M	CLASS
62.	19	4.0	122	119	50.0	35.0	86.0	74.0	86.0	84.5	II
63.	12	9.0	116	119	48.5	34.5	84.0	70.0	86.0	84.0	II
64.	14	6.5	119	119	47.5	31.0	85.5	76.0	85.5	87.0	II
65.	22	3.5	116	119	44.5	35.0	86.0	71.5	85.5	84.5	N
66.	20	5.0	122	119	47.0	33.5	85.0	76.0	85.5	85.5	N
67.	20	5.0	126	119	45.0	33.5	90.5	77.5	91.0	87.5	N
68.	13	4.5	119	120	50.5	38.0	81.5	67.0	82.0	82.0	II
69.	16	7.5	116	120	48.0	34.5	86.0	69.5	87.5	85.5	II
70.	14	6.5	119	120	47.0	34.5	85.5	72.5	86.0	84.5	II
71.	22	2.0	120	120	45.0	36.5	87.0	74.5	87.0	84.5	I
72.	16	3.0	124	121	50.5	38.0	85.5	74.0	86.0	84.5	I
73.	12	7.0	123	121	49.0	34.5	91.5	73.0	92.0	87.0	II
74.	19	5.0	123	122	50.5	40.5	88.0	74.5	88.5	81.5	II
75.	13	5.5	130	122	49.0	35.0	91.0	76.5	92.0	88.5	I
76.	21	3.5	121	122	49.0	36.5	85.5	73.5	86.5	86.0	I
77.	18	3.0	121	122	45.5	33.5	90.0	80.0	90.0	89.0	I
78.	20	7.0	126	122	48.5	34.5	88.0	73.0	90.5	88.0	I
79.	14	1.0	123	122	43.0	34.0	85.5	73.0	87.5	89.0	N
80.	23	4.0	130	123	49.0	35.5	88.0	78.0	88.5	88.0	N
81.	19	4.0	126	123	47.0	37.0	87.0	73.0	89.0	86.5	N
82.	23	3.5	126	123	48.5	36.0	87.5	76.5	88.0	87.5	N
83.	27	1.0	131	123	48.5	36.0	92.5	80.5	92.5	90.0	I
84.	13	8.0	124	123	49.0	36.5	93.0	76.5	93.5	87.0	II
85.	16	7.0	127	123	46.0	34.5	92.0	74.0	93.5	88.0	II
86.	13	6.5	122	123	48.0	36.0	87.5	71.0	89.0	86.5	II
87.	17	9.5	121	123	45.0	31.5	87.0	71.0	91.5	91.0	II
88.	30	4.0	131	124	53.0	40.0	89.5	76.0	90.0	87.0	II
89.	14	4.0	128	124	50.0	38.0	90.0	77.0	90.0	87.5	II
90.	17	2.0	127	124	48.0	35.0	88.0	78.0	88.0	89.5	II
91.	14	2.0	127	124	47.0	35.5	88.0	73.0	89.0	89.0	I
92.	20	10.0	124	124	43.5	33.0	90.0	75.0	93.0	92.0	I
93.	19	3.0	124	125	46.5	38.0	84.0	75.0	85.0	86.5	N
94.	22	8.0	123	125	50.0	37.0	91.0	78.0	91.0	89.0	N
95.	26	3.0	127	125	47.0	38.5	85.5	76.0	86.0	87.0	N
96.	18	5.5	126	125	49.0	39.0	87.0	74.5	88.0	87.0	I
97.	17	7.0	130	126	50.0	35.5	93.0	76.5	95.0	91.0	II
98.	13	3.0	129	126	50.5	39.0	87.0	76.5	87.5	87.0	N
99.	26	3.0	131	126	47.0	36.5	90.5	80.5	91.0	89.0	N
100.	22	1.5	125	126	47.5	36.5	86.0	77.0	87.5	90.0	N
101.	17	4.5	133	127	49.5	37.0	93.5	82.5	93.5	91.5	I
102.	21	3.0	132	127	53.0	39.5	91.0	78.0	91.5	89.5	N
103.	23	6.0	129	128	47.5	34.0	91.5	79.0	93.0	93.5	II
104.	20	4.5	121	128	47.0	37.5	90.0	79.0	90.5	90.0	N
105.	25	0.0	135	128	49.0	41.0	89.5	77.0	90.0	88.0	N
106.	19	4.0	130	129	47.5	36.5	89.5	76.0	93.0	93.5	N
107.	25	4.5	122	129	50.0	35.0	89.5	81.5	90.0	95.5	N
108.	28	2.0	135	129	52.0	41.0	90.0	81.0	91.0	90.5	N
109.	23	3.0	132	130	49.0	41.5	91.5	78.5	92.0	89.0	N
110.	28	5.0	131	132	50.0	38.0	90.5	78.0	92.0	94.0	N
111.	24	5.5	127	132	48.0	42.5	94.5	80.0	95.0	94.0	N
112.	24	6.0	132	132	48.5	40.0	93.0	77.0	96.0	93.0	N
113.	23	3.5	134	132	46.5	36.5	94.5	80.5	97.5	96.5	N
114.	26	3.5	133	132	49.5	40.5	93.0	80.0	94.5	92.0	N
115.	24	2.0	131	134	48.0	38.5	91.5	79.5	94.0	96.0	N
116.	25	2.0	138	134	53.5	43.5	94.0	83.5	94.0	92.0	I
117.	25	2.0	134	135	52.0	44.0	90.5	84.5	90.5	92.0	N
118.	28	4.0	135	135	59.0	45.0	92.0	85.0	92.0	92.0	N
119.	25	5.0	134	136	56.0	41.0	93.0	83.0	94.0	95.5	N
120	19	4.0	140	141	53.0	42.0	98.0	87.0	99.0	99.0	I

*All measurements are in millimeters.

TABLE IIB. MEANS AND STANDARD DEVIATIONS OF THE MEASUREMENTS USED IN THIS STUDY (IN MM.)

	AGE (YEARS)	OVERBITE	ANTERIOR FACE HEIGHT	PERPEN-DICULAR FACE HEIGHT	LOWER INCISAL HEIGHT	LOWER MOLAR HEIGHT	UPPER INCISAL HEIGHT	UPPER MOLAR HEIGHT	N-I	N-M
Entire group	17±	4.6±	121±	119±	46.5±	34.7±	85.5±	72.9±	86.3±	85.0±
	4.9	2.1	8.0	7.4	3.3	3.5	4.9	5.3	6.1	5.2
Normal cases	22±	3.6±	126±	125±	48.1±	37.3±	87.9±	76.6±	88.9±	88.5±
	3.7	1.5	6.9	7.1	3.4	3.3	4.3	4.3	4.5	4.8
Class I cases	15±	4.4±	119±	117±	45.6±	33.9±	84.6±	71.7±	85.2±	83.7±
	3.9	2.5	8.4	6.8	3.3	3.0	5.0	5.3	5.4	4.9
Class II cases	15±	5.7±	118±	117±	46.1±	33.2±	84.2±	70.6±	85.1±	83.5±
	3.5	1.8	6.3	5.4	3.1	2.8	4.6	3.8	5.0	4.2

TABLE III. MEANS AND STANDARD DEVIATIONS OF THE LOWER AND UPPER "RATIOS" FOR SLIGHT, MEDIUM, AND SEVERE OVERBITE GROUPS

	LOWER RATIO (PER CENT)	UPPER RATIO (PER CENT)
Slight overbite	129 ± 6	115 ± 4
Medium overbite	135 ± 8	117 ± 4
Severe overbite	137 ± 5	122 ± 3

among the three classes (Table V); the only apparent difference was in the correlation of upper ratio to overbite in Class II cases which was slightly greater than for normal or Class I cases. However, owing to the relatively small number of cases in each class, it is not possible to draw any definite conclusions regarding variations between the different classes.

TABLE IV. CRITICAL RATIOS OF THE MEANS OF THE LOWER AND UPPER "RATIOS" FOR SLIGHT, MEDIUM, AND SEVERE OVERBITE GROUPS

	LOWER RATIO	UPPER RATIO
Slight and severe overbite	4.6	6.5
Slight and medium overbite	3.6	2.0
Medium and severe overbite	1.4	6.7

Below 2.0, not significant.
2.0 to 2.5, suggestive.
2.6 and above, significant.

Means and standard deviation values for N-I and N-M were 86.3 ± 6.1 mm. and 85.1 ± 5.2 mm., respectively. There is no significant difference between these means but individual cases show variations depending on the extent of overbite. The difference between these two measurements (N-I minus N-M) was correlated to overbite. There was a definite significant correlation (+0.34) which, though a little smaller than the upper ratio correlation, confirms the same findings. The smaller value of this correlation may be explained as being due to a small amount of anteroposterior component involved in these measurements. Again there were no significant differences between the three classes (Table V).

TABLE V. CORRELATION OF "RATIOS" AND "PROPORTIONS" WITH OVERBITE

	ENTIRE GROUP	NORMAL GROUP	CLASS I GROUP	CLASS II GROUP
Lower ratio	+0.40	+0.32	+0.32	+0.29
Upper ratio	+0.54	+0.31	+0.30	+0.53
Lower incisal proportion	−0.02	+0.14	−0.11	−0.24
Lower molar proportion	−0.45	−0.22	−0.33	−0.42
Upper incisal proportion	+0.40	+0.31	+0.31	+0.28
Upper molar proportion	−0.23	+0.11	−0.13	−0.37
N-I minus N-M	+0.34	+0.20	+0.36	+0.18

See "Findings" in text for explanation of significance.

III. The third objective was to determine the location of variations in the vertical levels of teeth associated with variations in the amount of overbite.

For this purpose incisal or molar height measurements as such were of little value because of the wide range of variations in the size of skulls of different individuals. However, the proportions of the various parts of the facial skeleton are not materially influenced by size. Therefore, it was desirable to express the incisal and molar heights as percentages of some other vertical measurement. Because of its wide use in cephalometric studies the face height was considered for this purpose. This was measured as the distance from nasion to pogonion (N-Pg) and is referred to in this paper as "anterior face height." However, before using the anterior face height for such a purpose, it was essential to establish that this measurement itself was not influenced by the variables being studied. The anterior face height was found not suitable in this respect because there was a significant difference between the means of this height for slight and severe overbite groups (Table VI).

TABLE VI

A. MEANS AND STANDARD DEVIATIONS OF "ANTERIOR" AND "PERPENDICULAR" FACE HEIGHTS FOR SLIGHT, MEDIUM, AND SEVERE OVERBITE GROUPS

	ANTERIOR FACE HEIGHT (MM.)	PERPENDICULAR FACE HEIGHT (MM.)
Slight overbite	124.8 ± 8.3	121.7 ± 8.0
Medium overbite	120.5 ± 8.0	119.1 ± 7.7
Severe overbite	118.2 ± 6.3	118.0 ± 5.0

B. CRITICAL RATIOS OF THE MEANS FOR SLIGHT, MEDIUM, AND SEVERE OVERBITE GROUPS

	ANTERIOR FACE HEIGHT	PERPENDICULAR FACE HEIGHT
Slight and severe overbite	2.7	1.7
Slight and medium overbite	2.0	1.2
Medium and severe overbite	1.4	0.8

Below 2.0, not significant; 2.0 to 2.5, suggestive; 2.6 and above, significant.

Almost all of the measurements in this study were perpendicular measurements. Therefore it appeared that face height expressed as a perpendicular measurement would be more appropriate and could be used for our purposes. This was measured as a perpendicular line drawn from nasion to the mandibular plane and is referred to as "perpendicular face height." There was no

TABLE VII. MEANS AND STANDARD DEVIATIONS OF THE "PROPORTIONS" FOR SLIGHT, MEDIUM, AND SEVERE OVERBITE GROUPS

	SLIGHT OVERBITE	MEDIUM OVERBITE	SEVERE OVERBITE
Lower incisal proportion (%)	38.6 ± 1.5	39.3 ± 1.9	38.8 ± 1.7
Lower molar proportion (%)	29.9 ± 1.5	29.1 ± 1.7	28.2 ± 1.6
Upper incisal proportion (%)	70.9 ± 2.1	71.5 ± 1.9	73.0 ± 1.7
Upper molar proportion (%)	61.9 ± 2.4	61.2 ± 1.8	59.8 ± 1.5

significant difference in the means of this height for slight, medium, or severe overbite groups (Table VI). The perpendicular face height shows a smaller correlation (–0.1) with overbite than the anterior face height (–0.2). However neither of these correlations is significant.

The incisal and molar height measurement (upper and lower) were, therefore, expressed as percentages of the perpendicular face height, and means and standard deviations of these "proportions" were computed for slight, medium, and severe overbite groups (Table VII). The standard deviations of these proportions are strikingly small and show the reliability of this procedure. The critical ratios of the means are shown in Table VIII. There were definite significant differences between the means of slight and severe overbite groups for the lower molar, upper incisal, and upper molar proportions. There were no significant differences in the means of the lower incisal proportion.

TABLE VIII. CRITICAL RATIOS OF THE MEANS OF THE "PROPORTIONS" FOR SLIGHT, MEDIUM, AND SEVERE OVERBITE GROUPS

	SLIGHT AND SEVERE OVERBITE	SLIGHT AND MEDIUM OVERBITE	MEDIUM AND SEVERE OVERBITE
Lower incisal proportion	0.4	1.7	1.2
Lower molar proportion	3.3	1.9	2.3
Upper incisal proportion	3.3	1.1	3.5
Upper molar proportion	3.1	1.1	3.9

Below 2.0, not significant; 2.0 to 2.5, suggestive; 2.6 and above, significant.

Having established the changes in the lower molar, upper incisal, and upper molar proportions are associated with changes in the extent of overbite, the next step was to determine the degree of this association (correlation). The means and standard deviations of these proportions are shown in Table IX and correlation with overbite in Table V.

TABLE IX. MEANS AND STANDARD DEVIATIONS OF THE "RATIOS" AND "PROPORTIONS" FOR THE ENTIRE GROUP, NORMAL, CLASS I, AND CLASS II CASES

	ENTIRE GROUP	NORMAL CASES	CLASS I CASES	CLASS II CASES
Lower ratio (%)	135 ± 7.6	129 ± 6.8	135 ± 6.3	139 ± 6.8
Upper ratio (%)	118 ± 4.4	115 ± 3.5	119 ± 4.3	119 ± 3.9
Lower incisal proportion (%)	39.0 ± 1.8	38.5 ± 1.9	39.0 ± 1.7	39.4 ± 1.7
Lower molar proportion (%)	29.0 ± 1.7	29.8 ± 1.5	28.9 ± 1.5	28.4 ± 1.9
Upper incisal proportion (%)	71.7 ± 2.0	70.5 ± 1.9	72.3 ± 1.8	72.1 ± 1.9
Upper molar proportion (%)	61.0 ± 2.0	61.4 ± 1.6	60.6 ± 2.0	60.4 ± 1.8
N-I minus N-M (mm.)	-1.2 ± 2.2	0.5 ± 2.0	1.5 ± 2.0	1.6 ± 2.1

The lower incisal proportion shows no correlation in any of the classes. The lower molar and upper incisal proportions show strong negative and positive correlations, respectively. There is no significant difference among the three classes for these correlations. There appears to be a suggestive difference in the correlation of upper molar proportion between normal and Class II occlusion. Neither normal nor Class I cases show a significant correlation for this proportion but Class II occlusions show a suggestive correlation. The correlation for the whole group is strongly suggestive.

The correlations for the upper proportions are somewhat smaller than for the upper ratio. This may be interpreted to mean that in the maxillary teeth supraclusion of incisors and infraclusion of molars are operative to different degrees in different cases.

Due to the relatively small number of cases in each class, the correlations for the individual classes do not run nearly as high as for the total group, and their significance is correspondingly reduced. Therefore, any dogmatic conclusion about the various classes separately cannot be made.

DISCUSSION

A survey of damages attributed to excessive overbite, and its importance in successful orthodontic therapy, reveals the importance of a thorough understanding of the factors involved in its causation.

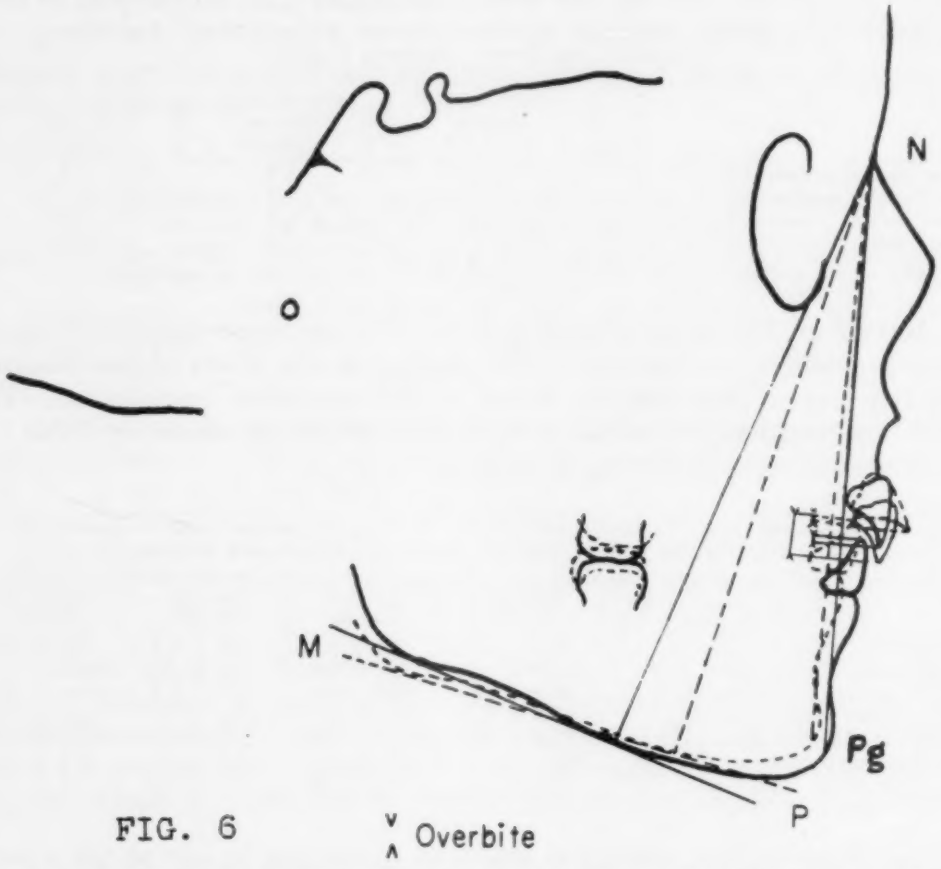

FIG. 6

Fig. 6.—Showing a "normal" case (thick solid): a case with infraclusion of molars (fine dotted) with consequent overclosure of the mandible when the teeth are brought into occlusion (thick dotted); thus the lower incisors are carried up toward the gums palatal to the upper incisors. The position of the upper incisors in cases of excessive overbite is shown in fine solid, while the upper incisor in thick dotted is the position of this tooth in the "closed-bite" cases without excessive overbite. Note that the labial inclination of incisors in such cases carries the incisal edge away from the plane of occlusion to a position of infraclusion.

Overbite has been defined as "overlapping of the upper and lower central incisors in the vertical plane."[46] Using this definition as a guide, a method of measuring overbite had to be devised which would not be influenced by other extraneous factors. Goldstein and Stanton's method[4] was the nearest approach but, as stated before, changes in the vertical level of molars influenced this measurement. The vertical level of the teeth as related to the

amount of overbite was under examination in this study. Obviously, then, their method could not be used for our purposes. The method described in this study appears to be sound, and the measurement is influenced only by changes in the "overlapping of the upper and lower central incisors in the vertical plane," thus enabling valid comparisons between different cases.

The definition of overbite does not include the type of cases which, though many times referred to as "excessive overbite cases," are in reality only "closed-bite cases" without the presence of excessive overbite. In these cases "overlap of the upper and lower incisors in the vertical plane" is not excessive, but the lower incisors are biting into the gingivae palatal to the upper incisors. These cases have a common denominator with cases of excessive overbite in which the molars appear to be infraclusion, thus permitting overclosure of the mandible. However, associated with this in these cases of "closed-bite" is a usually severe labial inclination of the uper incisors which carries the incisal edges of these teeth away from the occlusal plane to a position of infraclusion (Fig. 6). Thus as far as vertical overbite is concerned, this infraclusion of the upper incisors counteracts to varying extent the effect of infraclusion of the molars.

There has been some discussion of the ultimate factors operative in excessive overbite.[47, 48, 49] From the findings of this study it seems justified to conclude that these factors affect overbite by the vertical positioning of the teeth.

CONCLUSIONS

1. The extent of overbite varies with the relative vertical level of anterior teeth as related to the posterior teeth.

2. Statistically, variations in the vertical level of lower molars and upper incisors show strong association with variations in the amount of overbite (negative and positive, respectively).

3. The vertical position of the lower incisors does not show any correlation to the amount of overbite.

4. The vertical position of the upper molars shows a suggestive negative association with overbite, particularly in Class II (Angle) malocclusions.

5. Excessive overbite appears to be associated with infraclusion of mandibular molars and supraclusion of maxillary incisors, together with some infraclusion of maxillary molars. Lower incisors are not in supraclusion in cases exhibiting excessive overbite.

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DENTAL CORRELATION IN PITUITARY DWARFISM

Report of a Case

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THE anterior lobe of the pituitary controls practically all growth phenomena during infancy, childhood, and adolescence. This control is exerted directly through the pituitary growth hormone and through the influence of the pituitary on other endocrine glands, such as the thyroid, adrenals, and gonads. These endocrine glands are accepted to affect growth directly and by interaction with the anterior pituitary.

In pituitary dwarfism, the condition may not be recognized during the early years of childhood or until the intrinsic growth tendency of the tissues is exhausted. Osseous development is retained and does not respond to thyroid therapy. Sexual maturation is retarded and the facial and other bodily features appear childish and immature. Diagnosis of hypopituitary dwarfism is difficult to establish in the prepubertal period. Differential diagnosis must be made between hypopituitary dwarfism and dwarfism due to other causes such as delayed adolescence, primordial dwarfism, and ovarian agenesis.[1]

Dwarfism in hypopituitarism varies in degree in direct relation to the severity of the condition and the involvement of the other growth-controlling endocrine glands. While epiphyseal ossification and fusion are markedly retarded in hypopituitary dwarfism they are only moderately retarded in delayed adolescence and are found to be normal in primordial dwarfism and nearly normal in ovarian agenesis.

The facial features in ovarian agenesis show maturation but remain immature in delayed adolescence and in hypopituitarism.

While sexual development remains infantile in hypopituitary dwarfism, the primordial dwarf shows normal sexual maturation.

Deficiency of the anterior lobe of the pituitary gland in early childhood shows itself dentofacially in arrested growth and development as follows[2]:

1. There is lack or delay in development and growth with marked retardation in the development and growth of the cranium and face.
2. Abnormally dense calcification of dentine.
3. Delay in eruption, prolonged retention, and partial ankylosis of deciduous teeth with retardation of formation and eruption of permanent teeth.

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4. Persistence of juvenile dental characteristics such as small-sized roots, parallel pulpal walls, wide pulps, and retardation in closure of the apical foramina.

5. Crowding of teeth is not pathognomonic.

6. Tendency toward development of deep overbite (closed bite), with deficiency of vertical growth of the face.

7. In some cases (Lorain type and those of congenital origin) the teeth are small and no crowding is present.

Markus and co-workers[3] studied facial development in hypopituitary dwarfism in a group of eight patients by means of Hellman's[4] linear facial standards. No retardation of tooth eruption was found in this study. However, they did not ascertain how much and how long endocrine therapy was given these patients. Although malocclusion was present in all cases they studied, no classification was found to be pathognomonic. Root formation and closure of the tooth apices were found to be delayed and the pulp chambers were characteristically wide.

Thyroid, parathyroid, pituitary, and other endocrine dysfunctions appear as constant underlying conditions in disturbances of growth and in many types of malocclusion. Some dental and dentofacial disturbances have come to be regarded as pathognomonic of certain endocrinopathies. Gordon and Kuskin[5] stated that delayed onset of teething in the absence of signs pathognomonic of other diseases in children indicates endocrine disturbance.

Comroe, Collins, and Crane[6] stated that children with hypothyroidism constitute a large percentage of the patients requiring orthodontic treatment because of their abnormal jaw development and disturbed eruption.

Endocrine dysfunction, affecting, as it does, the growth and development of the osseous system, presents itself as an important etiologic factor in orthodontic conditions, especially when occurring in early life. The particular type of physical deformity manifested depends on the stage of development taking place at the onset and during the time of the endocrine dysfunction.

In cases of growth failure which present retardation in skeletal development, as shown by prolonged delay of epiphyseal closure, a differential diagnosis should be established to rule out delayed development of constitutional origin, especially in the absence of definite symptoms of endocrine disturbances. McCune[7] mentioned circus midgets who "grow" themselves out of their jobs during a growth spurt in late adolescence or even in their early twenties.

While it does not seem likely that endocrine disturbances in children can produce dental disturbances without showing evidence in other parts of the body, transitory and subclinical endocrine disturbances may possibly influence the dentition without showing marked general developmental disturbances.[8] Although the formation, development, and eruption of the teeth can be influenced by endocrine dysfunction, the dentition is not to be accepted as a sole pathognomonic sign. Additional diagnostic aids must be relied upon in establishing a diagnosis of endocrine dysfunction.

The relationship of endocrine dysfunction to the etiology of malocclusion must be regarded from the standpoint of hereditary influence, congenital and

postnatal causes. Dentofacial dysharmonies should not be attributed to endocrine dysfunction without proper diagnosis being made by the endocrinologist or internist. At the same time, the orthodontist treating children should be on the alert, since early diagnosis and treatment of endocrinopathies, when the hormones are most active, is of greatest importance. While the orthodontist who suspects incretory involvement should insist on obtaining a diagnosis from a qualified source, he should not undertake to establish such diagnosis, much less should he undertake treatment.

CASE REPORT

History.—J. M., boy, aged 15 years, 1 month (Clinic No. c-28382), was a 5 pound, 4 ounce full-term baby, breech delivery. He was breast-fed for three months. He had no serious infancy illnesses. He was of Panamanian descent and was born in New York City. His mother had an essentially negative medical history; she was 4 feet 9½ inches tall. His father had a history of rheumatic heart disease; he was 5 feet, 2 inches tall. One brother aged 10 years, 8 months was within normal range for weight and height. His medical history was essentially negative (Fig. 1).

The patient was first brought to the outpatient department of The Mount Sinai Hospital at the age of 7 years because of his failure to grow normally. His mother first noticed his retarded rate of growth when he was 2 to 3 years of age. At the age of 6 years he was the same size as his brother who was then 3 years (Fig. 2).

On his entrance to the hospital, at the age of 7 years, he was 40 ½ inches tall and weighed 37 pounds, which is normal for a 4-year-old child. His bone age was found to be comparable with that of a 2-year-old child. He was put and kept on vitamin and thyroid therapy for about four years, being checked periodically. During that period his height age curve deviated even more from the normal.

Hospitalization Record.—

Tendency to anemia.

Red blood cells: October, 1944, R.B.C., 3,030,000
November, 1945, R.B.C., 3,220,000
November, 1946, R.B.C., 3,530,000

1. Blood cholesterol: 425, which is high. Normal is 165 to 200 mg. per 100 c.c. of blood plasma
2. Radioactive iodine uptake: 54 per cent within normal limits
3. Glucose tolerance test: flat glucose tolerance curve—consistent with pituitary deficiency
4. Insulin tolerance test: prolonged hypoglycemic reaction to induced hypoglycemia—consistent with pituitary deficiency
5. 17 ketosteroid value: 3—minimum for average boy of 14 is 10; suggests diminished adrenal activity due to diminished pituitary activity

Blood cholesterol is high in hypothyroidism. However, high blood cholesterol percentages may be familial and should not be depended upon as a sole diagnostic criterion.

Fig. 1.—*A*, Full-face view of patient J. M. at age 15 years, 1 month; hypopituitarism, showing characteristic immature facial features. *B*, Profile view. *C*, Full-face view of brother, A. M., aged 10 years, 4 months, medical history negative, showing normal facial development. *D*, Profile view of A. M.

Radioactive iodine uptake by the thyroid gland when less than 20 per cent is indicative of hypothyroid function. When over 60 per cent, it is indicative of hyperthyroidism.

Ketosteroid value is an indicator measure of sexual maturity. As a child approaches adolescence, the ketosteroid value rises. Normal for a boy of 14

years is 10. This patient had a value of 3, which indicates that sexually he was far from approaching adolescence.

Developmental History.—

Chronologic Age	*Bone Age*
7 yr.	2 yr.
8 yr.	2 yr.
9 yr.	4-5 yr.
10 yr.	4-5 yr.
11 yr.	4-6 yr.
12 yr.	6 yr.
13 yr.	7 yr., 3 mo.
13 yr., 8 mo.	

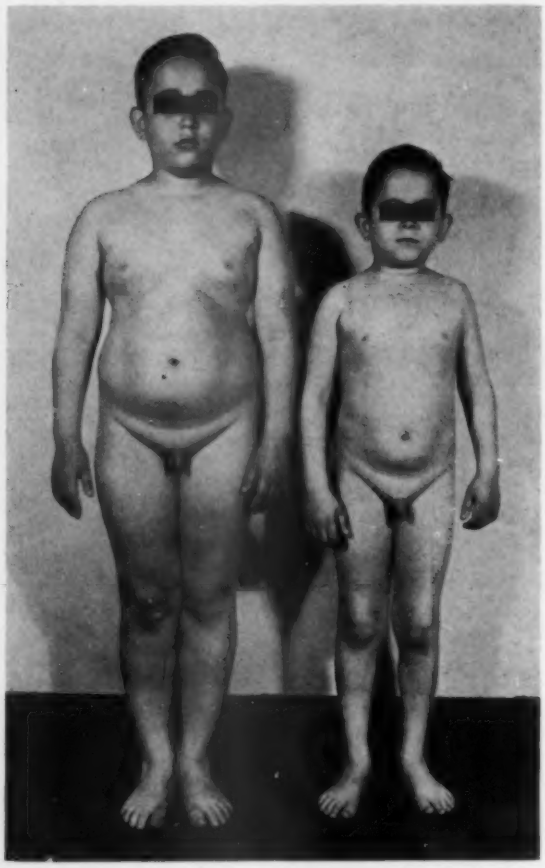


Fig. 2.—*Left,* A. M., brother, aged 10 years, 4 months, of patient J. M., height is 54 inches, normal for age. Slightly obese. *Right,* Patient J. M., aged 15 years, 4 months; height is 48 inches which is median normal for the age of 7 years. Patient J. M. had received thyroid therapy for previous four years. Patient does not show signs of normal sexual development, which usually begins at about the age of 12 years.

Nutritional History.—The patient received vitamin therapy for four years. No appreciable improvement in nutritional status or growth was noted during this period.

Endocrine History.—The patient was on thyroid therapy for four years and showed no response. His height deviated even more from the mean for

his age. He grew at an extremely slow rate during that period. The patient was given methyltestosterone from March, 1949, to March, 1950, and responded with 2¼ inches growth in about one year. His height age and bone age showed an appreciable rise since he began receiving methyltestosterone. (Fig. 3).

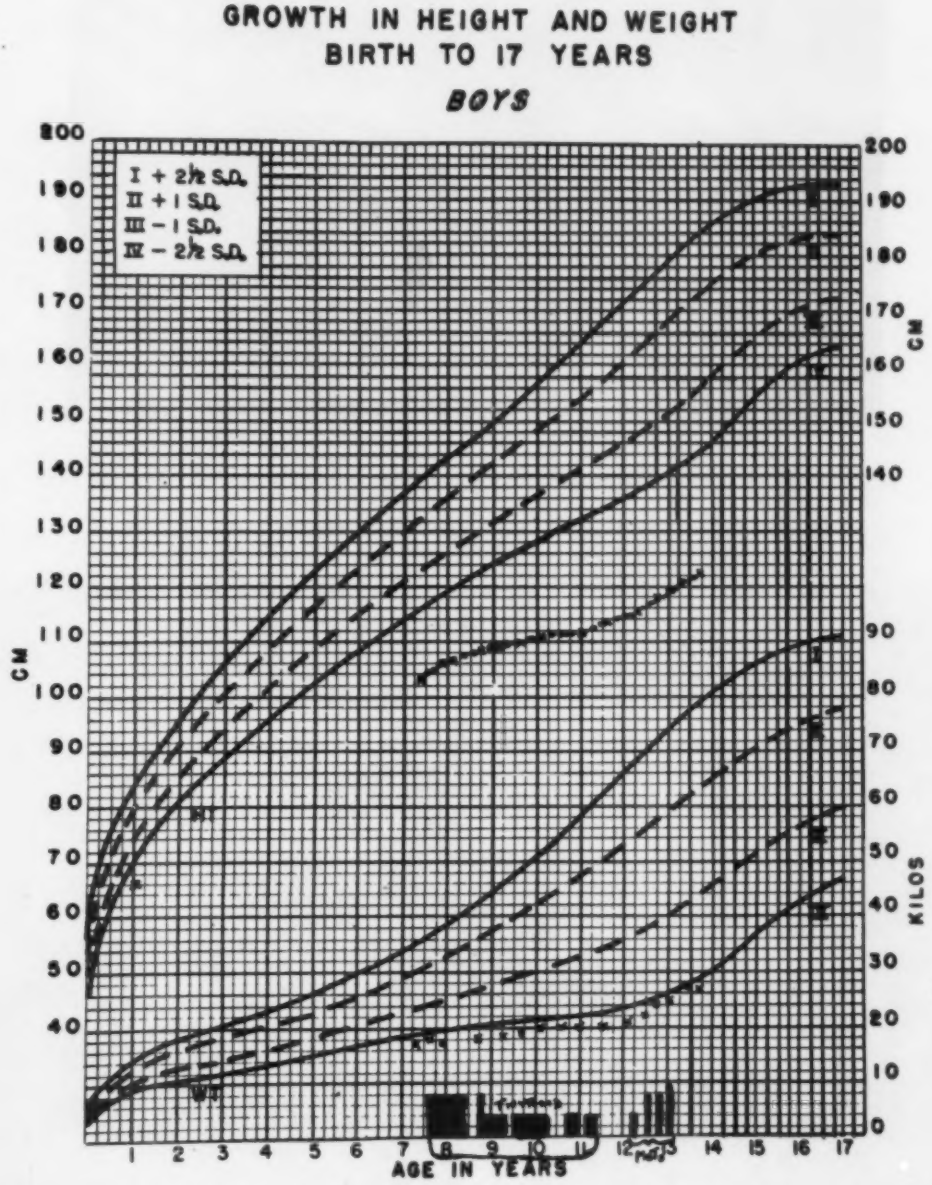
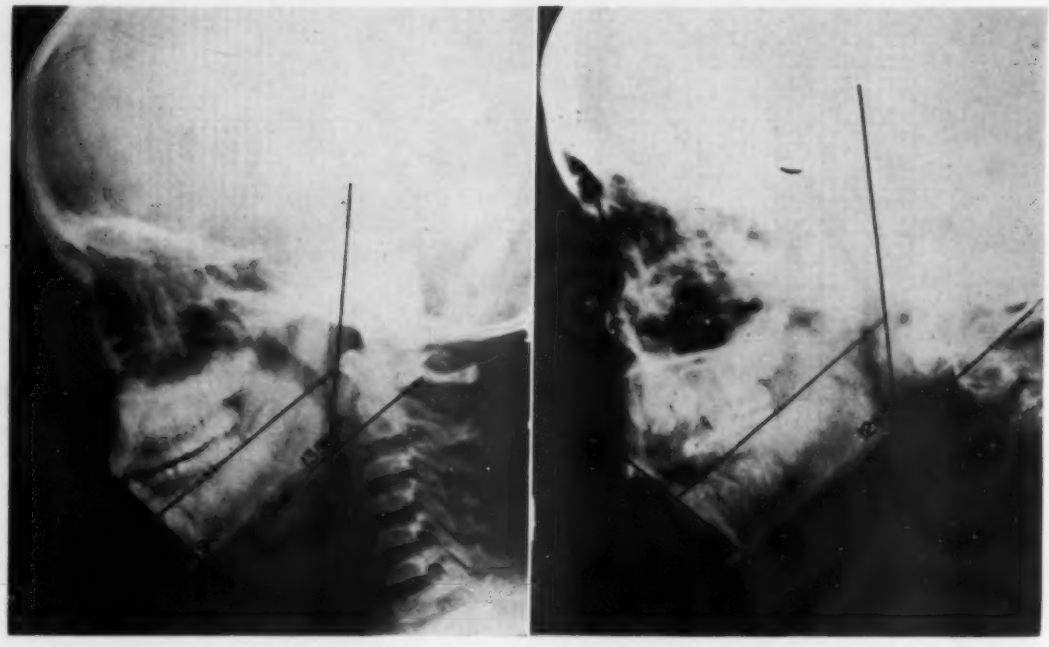


Fig. 3.—Chart plotted to show standard growth in height and weight of boys from birth to the age of 17 years. Height of patient J. M. from the age of 7½ to the age of 14 years (broken line) is approximately 22 cm. Less than the lowest quartile on the standard grid. Weight of patient J. M. (broken line) is shown to be constantly below the lowest quartile shown on grid. Bar graphs show period when patient J. M. was receiving thyroid therapy and methyltestosterone, respectively. Note marked rise in height and weight with beginning of methyltestosterone.

A. *B.*

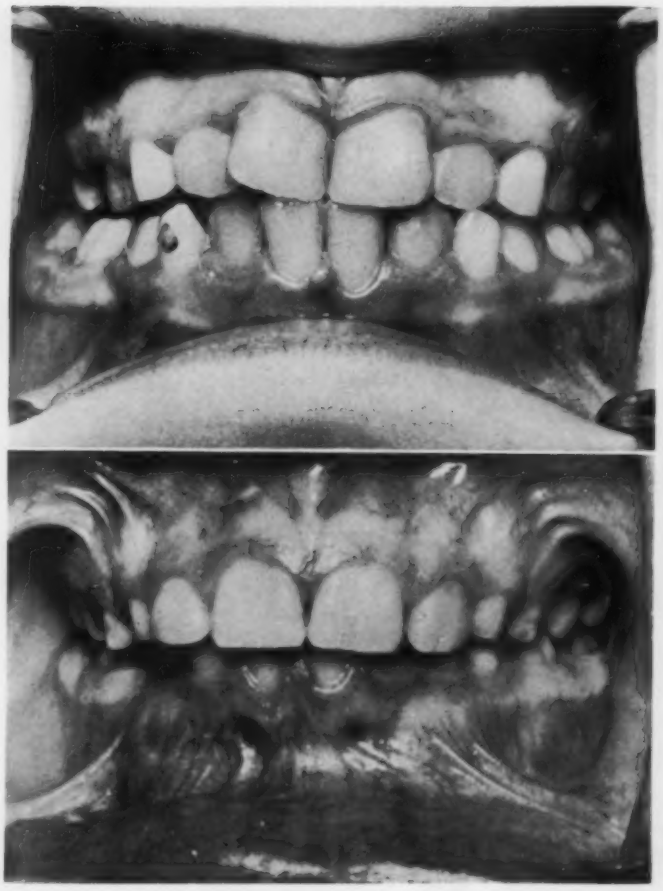
Fig. 4.—*A* and *B*. *(For legend, see opposite page.)*



A. *B.*

Fig. 5.—*A* and *B*. *(For legend, see opposite page.)*

A.



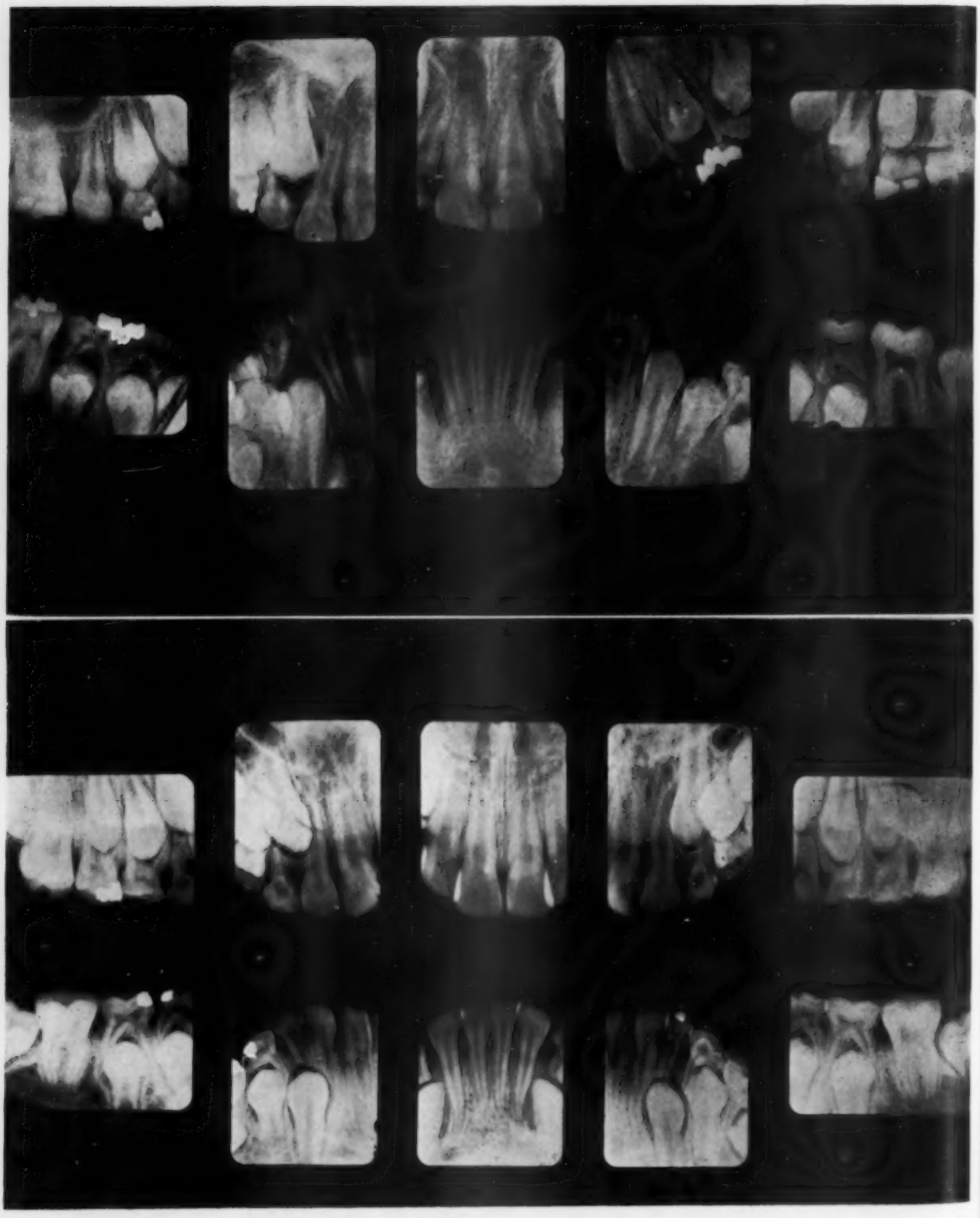
B.

Fig. 6.—*A*, Patient J. M., showing teeth slightly separated. Dental arches show crowding of permanent incisors. There is no pathognomonic dental morphology as is often claimed. The stage of development of the dentition is equal to that of a child between 7½ and 8 years of age. *B*, Front view of teeth of A. M., 10-year-old brother of patient J. M., showing normal development for his age.

Fig. 4.—*A*, Normal wrist roentgenograms of a boy at the age of 14 years. The spaces between epiphyses and diaphyses in the phalanges are narrow. Metacarpal epiphyses have begun union with their diaphyses. There is a definite break on the ulnar side of the radial epiphyses. *B*, Wrist roentgenograms of patient J. M., which is similar to the standard for the age of 7 years. The ulnar epiphysis is just beginning to calcify. The pisiform is still absent. The greater and lesser multangular and navicular are small and do not show their final forms. The epiphyses are narrower than the bones with which they will eventually unite. The spaces between the epiphyses and diaphyses are still quite wide. Note also difference in size of hands.

Fig. 5.—Cephalostatic profile roentgenograms taken at the same target distance and reduced an equal amount for this illustration. Lines run through long axes of mandibular incisors to mandibular plane (line tangent to most dependent points on base of mandible); tangent to postcondylar point and most distal point on mandibular ramus and a line through the middle of the basal arch of the mandible (line through most constricted portion of the body of the mandible seen in profile) and parallel to the mandibular plane. *A*, Patient J. M., shows an incisor-mandibular plane angle of 94 degrees and a gonion angle of 135 degrees. *B*, The younger brother, A. M., shows an incisor-mandibular plane angle of 95.5 degrees and a gonion angle of 126 degrees. The angles are not significant. The line through the basal arch in patient J. M. is 20 per cent shorter than that in A. M., indicating that the body of the mandible in patient J. M., who is 15 years, 1 month of age, is shorter than in his brother A. M., who is 10 years, 4 months of age. The relatively smaller size of the skull of patient J. M. is evident.

A.



B.

Fig. 7*A* and *B*. (*For legend, see opposite page.*)

ME TIGHTLY BOUND

Present Health.—His health at the time of writing was good. He was physically well proportioned. He was showing progress on methyltestosterone. All other medication had been stopped.

After seven years of treatment with thyroid extract and methyltestosterone, he achieved the following percentages of normal maturation for his present age (15 years): height, 78 per cent; weight, 57 per cent, and bone age, 54 per cent (Fig. 4).

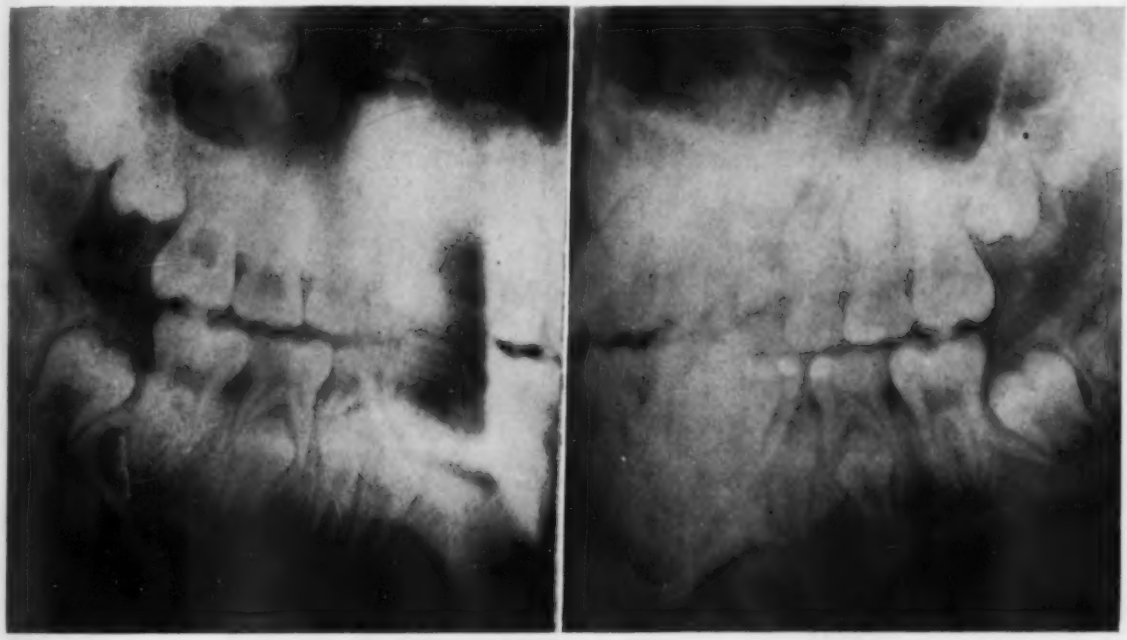


Fig. 7*C*.—Lateral jaw roentgenograms of patient J. M. at the age of 15 years. In this disturbed pattern of dental development due to hypopituitarism, the mandibular third molars are situated in the body of the mandible, past the inner angle of the ramus and body of the mandible, which is usually not found before the age of 15 years. The permanent second molars are still unerupted and the deciduous molars show failure of root resorption, although the roots of the premolar teeth are about two-thirds to three-quarters calcified.

Height: 48 inches. Normal for age 15 years ranges from 60 inches to 70 inches. Patient was as tall as a normal 7-year-old child.

Weight: 60 pounds. Normal for age 15 years is 94 to 105 pounds. Patient was somewhat on obese side for his height.

Bone age: Approximately 8 years.

Craniofacial Development.—Cranial and facial growth of the patient showed general retardation. He retained the characteristic infantile facial

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Fig. 7*A*.—Dental roentgenograms of A. M., 10-year-old brother of patient J. M., showing normal development of dentition for his age. Permanent central and lateral incisors and permanent first molars have erupted. Right deciduous mandibular canine and deciduous first molar have been exfoliated and the succeeding permanent canine and first premolar are erupting. Maxillary left second premolar has erupted. Deciduous molars show resorption of roots, prior to eventual shedding and displacement by premolar teeth. *B*, Dental roentgenograms of patient J. M., aged 15 years, 1 month, show dental development of about 8 years of age. The pulp canals of the maxillary incisors are still open at the root apices, characteristic of hypopituitarism. The deciduous molars show failure of root resorption, although calcification of the premolars is from two-thirds to three-quarters completed.

appearance of hypopituitary dwarfism. Length of the body of the mandible was about 20 per cent less than in the brother who was more than four years younger (Fig. 5).

Dental Age.—His dental history revealed very marked retardation in the exfoliation of deciduous teeth and eruption of permanent teeth. According to the tables of dental eruption his dental age was (at age 15) approximately 8 years.

Occlusion.—He had a normal relationship of the upper and lower dental arches. His overbite was normal. There was a slight crowding of the anterior teeth in both jaws (Fig. 6).

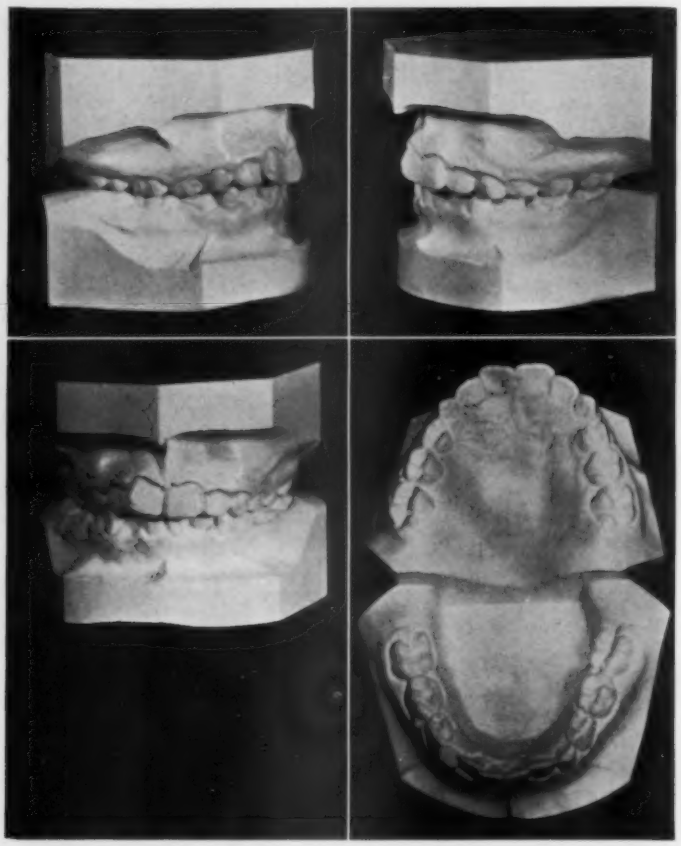

Fig. 8A.—Casts of patient J. M. The mixed dentition characteristic of a child around the age of 7 or 8 years is present, although the patient is 15 years, 1 month of age. There is slight crowding in the incisor region. Occlusal view of casts of patient J. M. shows deciduous canine and deciduous molars in position. Permanent second molars, which erupt about the age of 12 years, are still unerupted in this patient who is over the age of 15 years.

Dental Development.—Roentgenograms revealed wide pulp chambers and a failure of the roots of the deciduous molars to become resorbed. The caries attack rate was low. There were 4 filled teeth. The tongue and gingiva were negative (Fig. 7).

His first deciduous tooth erupted at 1 year of age. The permanent mandibular molar erupted at 9 years (normal is 6 to 7 years), and the per-

manent mandibular central incisors at 10 years (normal, 6 to 7 years). At the time of writing (aged 15 years, 1 month) the patient showed retention of all mandibular and maxillary deciduous cuspids, and first and second deciduous molars. The permanent second molars showed failure of eruption (Fig. 8).

Fig. 8*B*.—Casts of A. M., brother of patient J. M., showing normal development for his age. The slight overbite of the incisor teeth may be considered an aspect of dental arch development, until the eruption of the permanent second molars and premolars. Casts of A. M. showing well-developed dental arches. The maxillary left second premolar has erupted, the lower right deciduous canine and first molar have been lost, and the space for the oncoming permanent teeth shows self-maintenance.

SUMMARY

The patient shows dwarfism and retardation of dental development. The administration of thyroid hormone is known to accelerate dental development and eruption. Although this patient received thyroid therapy for a period of four years, his dental development is still extremely retarded and is following a disturbed pattern in which various stages of dental development are present simultaneously. For example, he shows absence of resorption of the deciduous canine and deciduous molar roots, which is found in children from the age of 8 onward. The permanent second molars, which usually are erupted at the age of 12 years, are still unerupted and have cortical bone overlying their occlusal surfaces. This is usually not found after the age of 12 years. To the contrary, the third molars are located in the body of the

mandible, which is not frequently seen before the age of 15 years. The facial features are characteristically infantile. There is no disproportion present in the upper and lower body segments.

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CLINICAL SIGNIFICANCE OF ROOT RESORPTION

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IN 1926, Dr. Albert H. Ketcham, of Denver, made a preliminary report of an investigation of apical root resorption of permanent teeth.[1] This was followed by a progress report in 1928.[2] Since that time, the significance of root resorption in relation to orthodontic therapy has been the subject of numerous papers published through the intervening years. For the most part, these have been basic studies, seeking out the causes of this phenomenon, its relationship to the therapy employed or to the metabolic background of the patient. A few papers on the clinical significance of root resorption have appeared, such as Zemsky's article in the *Journal of the American Dental Association* in 1929[3] and a few others during the period 1928-1936.

As a larger proportion of our population receives orthodontic treatment, the number of patients with apical resorption will increase. The reactions of the general practitioner of dentistry to this condition will depend upon published studies of the results of many treated cases.

This paper was prepared by sending a list of questions to 42 dentists, half of them orthodontists of wide experience, the other half men in general practice, particularly those whose experience might have enabled them to see many former orthodontic patients. The questions asked and a consensus of the answers will be given, together with some significant quotations. The literature was reviewed, and the conclusions reached by our questionnaire will be compared with some of the findings in previous papers. Finally, I wish to offer my own views on this problem. This presentation should establish a base line or consensus of opinion which, I hope, may be of some slight value as a guide to the profession on this subject.

In this discussion, it is not intended to dwell upon the physiologic phenomenon of root end resorption as it occurs in the shedding of the deciduous teeth. While the practical implications of variations in this process are not without great meaning to the orthodontist, nevertheless it is not of this but of resorption of the apical portion of the permanent teeth that we shall speak. Regarding the term "clinical significance," I found the word "clinical" most elusive when I tried the dictionaries in order to clarify what the term means to me. In the *American College Dictionary* I found the best approximation—"*clinical,* concerned with observation and treatment of disease in the patient (as distinguished from an artificial experiment)." This, then, is what we are dealing with: the significance of root end resorption of the permanent teeth in the observation and treatment of malocclusion in patients. As you will see from our questions, we are concerned not only with the immediate problem at the time of the treatment, but also the ultimate effects of root resorption on the expectancy of the dentition.

Presented at the Annual Meeting of the Northeastern Society of Orthodontists, New York, N. Y., March 4, 1952.

The first question asked was, "What is your experience with the *stability* of *position* of teeth showing resorption?" On this question almost all of the 30 replies were to the effect that the teeth showing root end resorption are stable in position. There was no significant difference in the opinions of the orthodontists and general practitioners on this. Some qualified this answer by pointing out that the teeth would be stable if in occlusal balance and if there were not excessive root loss. Others said that these teeth are as stable as unaffected teeth. Only one man said that such teeth are not stable. One orthodontist said, "Few if any teeth are stable."

Question number 2 dealt with *mobility* as follows: "Do these teeth develop excessive mobility?" On this question, 4 of those in general practice out of 16 replying indicated that excessive mobility could be expected. Others said that this depends on whether these teeth would be subject to excessive stresses. Only 1 orthodontist out of 14 felt that mobility would develop. Three men said that occasionally ankylosis of such teeth is encountered.

The third question which was posed was, "Have you experienced cases of progressive resorption resulting in exfoliation?" Thirteen out of 14 orthodontists said "No," but the general practitioners indicated that this could happen in extreme cases. These cases usually had complications, such as overloading, periapical infection, and two cited replanted teeth. In general, the consensus was that the resorptive process stops if the exciting cause is removed, and the teeth thus affected are then retained.

So far, the questions submitted to both groups were identical. Questions 4 and 5 were directed in a different manner to each group. First, those to the general practitioner: No. 4. "Have you seen frequent cases of alveoloclasia due to the proportionately lengthened clinical crown resulting from root end resorption?" One did not really answer, 8 said "No," 3 gave an equivocal answer, while 4 felt that they had seen frequent cases of alveoloclasia due to shortened roots. It would seem then, that opinion is divided on this question.

Our fifth question to the general practitioner was, "What is your experience with the suitability of teeth with resorption as abutments?" This produced some interesting variations in opinion. Seven out of 16 do not use such teeth as abutments, the others do but warned that the teeth should be joined to adjoining teeth and that overloading must be avoided. It would seem that in the minds of these operators, a tooth that has shown a tendency to apical resorption may be expected to resume this tendency if subjected to abnormal stresses.

To come back to our orthodontists, our fourth question to them was, "Have you found root end resorption usually associated with endocrine pathology of a degree sufficient to affect orthodontic treatment?" This question was prompted by the work of Hermann Becks on "Root Resorptions and Their Relation to Pathologic Bone Formation." Five out of 14 orthodontists replied "No"; 4 said they did not know or that in their opinion endocrinopathy was a factor in very few cases; and 4 said "Yes, there is an endocrine factor."

Question 5 was, "Have you attempted to continue treatment after finding apical resorption?" We find that 12 out of 14 men said "Yes"; 2 men usually

stop treatment. Most of those answering "Yes" qualified this by various comments, such as "Change method of treatment," "Finish treatment quickly," "Treat in conjunction with endocrine therapy."

The sixth question was the same for both groups, asking for general comment on the clinical significance of root end resorption. I should like to quote a few of the comments which were typical and some which impressed me as cogent. Dr. Samuel Charles Miller, a clinician of wide experience, states that root end resorption is of "no great significance except in differential diagnosis." A statement by Dr. Meyer A. Fish, of Newark, N. J., "In the healthy mouth teeth showing slight root end resorption apparently are well retained, remain and serve in function so long as nothing seems to excite further resorption. They bear watching to prevent being overburdened. In mouths with severe periodontoclasia, such resorbed teeth usually outrun the others in debilitation and are among the first to be lost." This seems to me to typify the views of the general practitioners. Dr. Stanley Tylman, of the University of Illinois, added the specific point that "so long as the length of the root exceeds that of the clinical crown, such a tooth may be safely used as an abutment."

Among the orthodontists, the general comments were more varied with several interesting thoughts presented. Dr. Allan Brodie pointed out, "The importance of the process from a clinical standpoint has been greatly overestimated. The retention apparatus of the tooth is largely restricted to the coronal 2/3rds of the root—its apical 1/3rd is relatively functionless in this regard. The loss of even a small degree of alveolar height (at the crest) is of greater significance." Others indicated that vertical elastics used in open-bite cases appeared to be an exciting cause of some importance, and that the degree of resorption was much less in depressing movements. Another writer noted that resorption was more frequently encountered in extraction cases having a double protrusion. The possibility of familial susceptibility was advanced by one man, while several others quoted examples of diverse reactions to treatment in the same family.

An excerpt from Dr. F. Copeland Shelden's letter follows: "I underwent a lot of Ribbon Arch Orthodontia myself over a long period (I was an uncooperative patient) about 30 to 35 years ago. There isn't a root in my mouth over a quarter of an inch long and hasn't been since I quit wearing appliances 30 years ago. The result, such as it is, is good and it is stable, the teeth are not loose excessively and my dentist tells me I have a good set of teeth for my age, which I don't usually tell."

Now that we have had a sketchy sampling of some current opinions on this subject, I should like to offer a few thoughts from the literature. At the beginning of this paper, I referred to the pioneer studies of Dr. Albert H. Ketcham, of Denver, entitled "A Progress Report of an Investigation of Apical Root Resorption of Vital Permanent Teeth." Some of his findings will interest you as bearing on our subject.

Approximately 19 per cent of the cases he studied showed radiographic evidence of resorption. This is quite close to the reports of Hemley,[4] (21.5 per cent) and Becks (20 per cent). Ketcham said, "It has been shown that the maxillary teeth are more susceptible to resorptions than the mandibular, also

in the 500 cases studied that where the ribbon-bracket or the pin and tube appliances were used, a much larger proportion of resorptions occurred than where the plain labial arch or the lingual appliances were used.'' We shall again refer to this statement, since it has been so widely quoted.

Ketcham's paper also brought out the importance of studying the variations in root anatomy. Curved roots, short roots, blunted root ends, and crooked roots are mentioned as factors to be considered.

In addition to the morphologic problems involved, Ketcham's paper raised the questions of diet and metabolism as approcahes to a better understanding of etiology of resorption. The experimental work of Marshall was occupying the interest and attention of the profession at that time.

Ten years after Ketcham's work had been published, Hermann Becks's paper was presented to the profession. It is in the May, 1936, issue of the INTERNATIONAL JOURNAL OF ORTHODONTIA and deserves your earnest study. Becks's work indicates the close relationship between metabolic disorders and susceptibility to root resorption. Although hypothyroidism is the most frequently found disorder, hyperpituitarism with manifestations of acromegaly is also of great importance. In this latter condition, there is a generalized root resorption. In addition to the endocrine disorders, Becks pointed out that some acute and chronic infectious diseases result in disturbances of mineral metabolism which are reflected in root resorption. With reference to the type and duration of treatment, may I quote from Becks, ''Neither the age at the beginning of orthodontic treatment nor the number of years' duration can be held responsible for the incidence of root resorptions. . . I am decidedly of the opinion that the root resorptions observed in orthodontic practice are produced not by mechanical force *alone*, but that they are rather the result of an individual predisposition to increased resorptive activity. . . . It seems best to advise the practicing orthodontist to exercise the greatest caution in the movement of teeth during the course of diseases accompanied by fever or in chronic diseases which have an influence on the general or mineral metabolism.''

In 1942, ''A Resume of the Literature on Root Resorption,'' by Dr. Sherwood R. Steadman, was published in the *Angle Orthodontist*. In this excellent paper the subject is reviewed and some of the apparent inconsistencies in the results of various investigators are explained. C. E. Rudolph, of the University of Minnesota, found resorption in 49 per cent of patients at the end of one year's treatment, and an increasing amount up to 100 per cent after three to six years of treatment. Since other investigators agree that the usual range of incidence of resorption is from 19 to 21.5 per cent, an explanation for this discrepancy is offered. ''These cases were treated mostly by undergraduates who had never before used an orthodontic appliance clinically. Adjustments were made weekly, except during the three summer vacation months, when patients would be seen perhaps twice by someone else; the next Fall, another student would carry on the case unless the former one did not graduate; and finally, the presence or absence of root resorption was not determined by one individual but by 'members of the orthodontic staff.' ''

The appliance used was the labial expansion arch, and strangely enough in the hands of Dr. Ketcham, only 1 per cent of root resorption resulted in his patients treated with it.

"Thus, the most logical conclusion to draw from these facts is that made by Dr. Milo Hellman when he discussed Dr. Ketcham's paper; 'It is not the kind of appliance that has really any connection with the character of resorption, it is what the appliance does that may be brought into connection with this phenomenon.' The latter part of his comment might well be altered to read 'what the appliance is made to do.' "

Steadman's conclusions are generally in accord with the findings of our survey.

The last piece of literature which we shall review is a paper which appeared in *The Journal of the American Dental Association*, March, 1951, by Drs. J. L. Henry and J. P. Weinmann working at the University of Illinois. In this study entitled, "The Pattern of Resorption and Repair of Human Cementum," 15 dentitions were investigated histologically. It was found that

1. Over 90 per cent of the teeth showed histologic evidence of resorption of the root.
2. The number of resorption areas and the susceptibility to resorption increased with age.
3. Seventy-six and eight-tenths per cent of the resorption areas occurred in the apical third of the root; 19.2 per cent in the middle third; and 4 per cent in the gingival third.
4. Resorption areas were more numerous on the mesial than on the distal surface, and also more numerous on the buccal than on the lingual surface. Little difference was noted between the right and left or upper and lower teeth.
5. Repair was evident in 85 per cent of the resorption areas. In most of these areas repair was anatomically complete.

My personal experience with this problem began in 1937 when a patient under treatment developed symptoms of salivary calculus in her early teens. A radiographic examination revealed some root resorption, whereupon more radiographs were taken. Treatment was discontinued and a conference was had with the family physician regarding possible endocrinopathy. An extensive investigation indicated that the patient had mild hypothyroidism which in the physician's opinion did not warrant therapy. About a year later, orthodontic treatment was resumed and completed without incident.

Fig. 1 shows radiographs taken at the end of treatment and Fig. 2 shows the same case five years later. May I point out the increased density of the bone immediately surrounding the resorbed roots. This is not commonly seen during the period of active resorption.

Since that time, many similar cases have been seen and treated. A typical example is shown herewith—the radiographs after four years of expansion (Fig. 3) and the radiographs after treatment (Fig. 4) involving the removal of the first premolars, and lingual torquing of the cheek teeth. This patient was investigated medically before continuation of treatment was undertaken. The findings were entirely negative, and you will note that there was not much additional resorption after treatment.

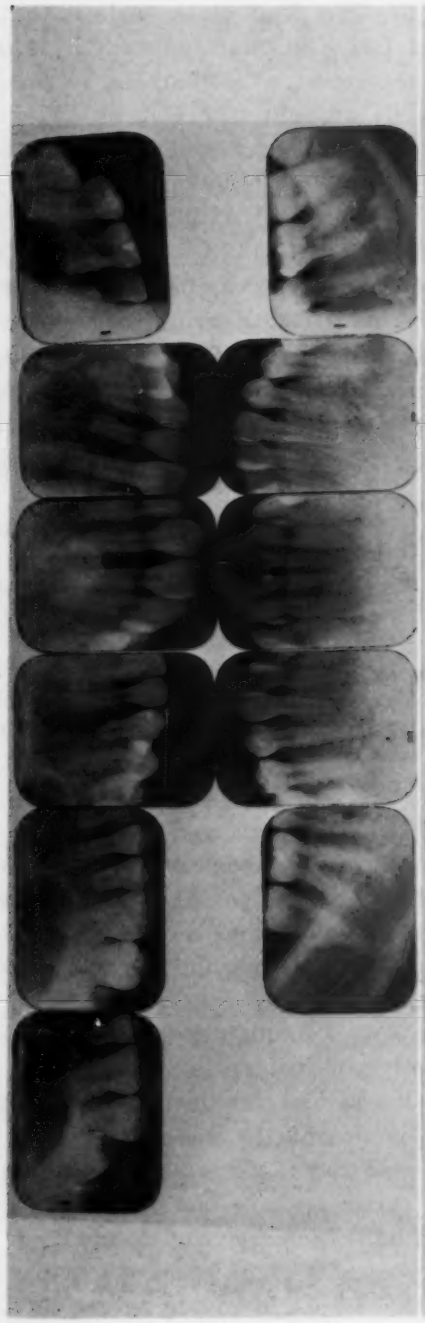

Fig. 1.

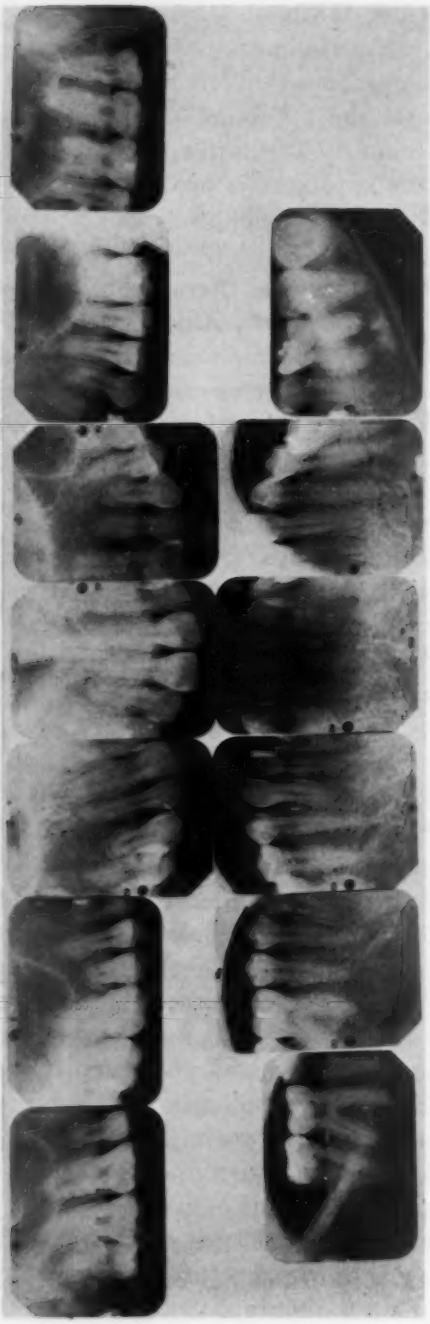

Fig. 2.

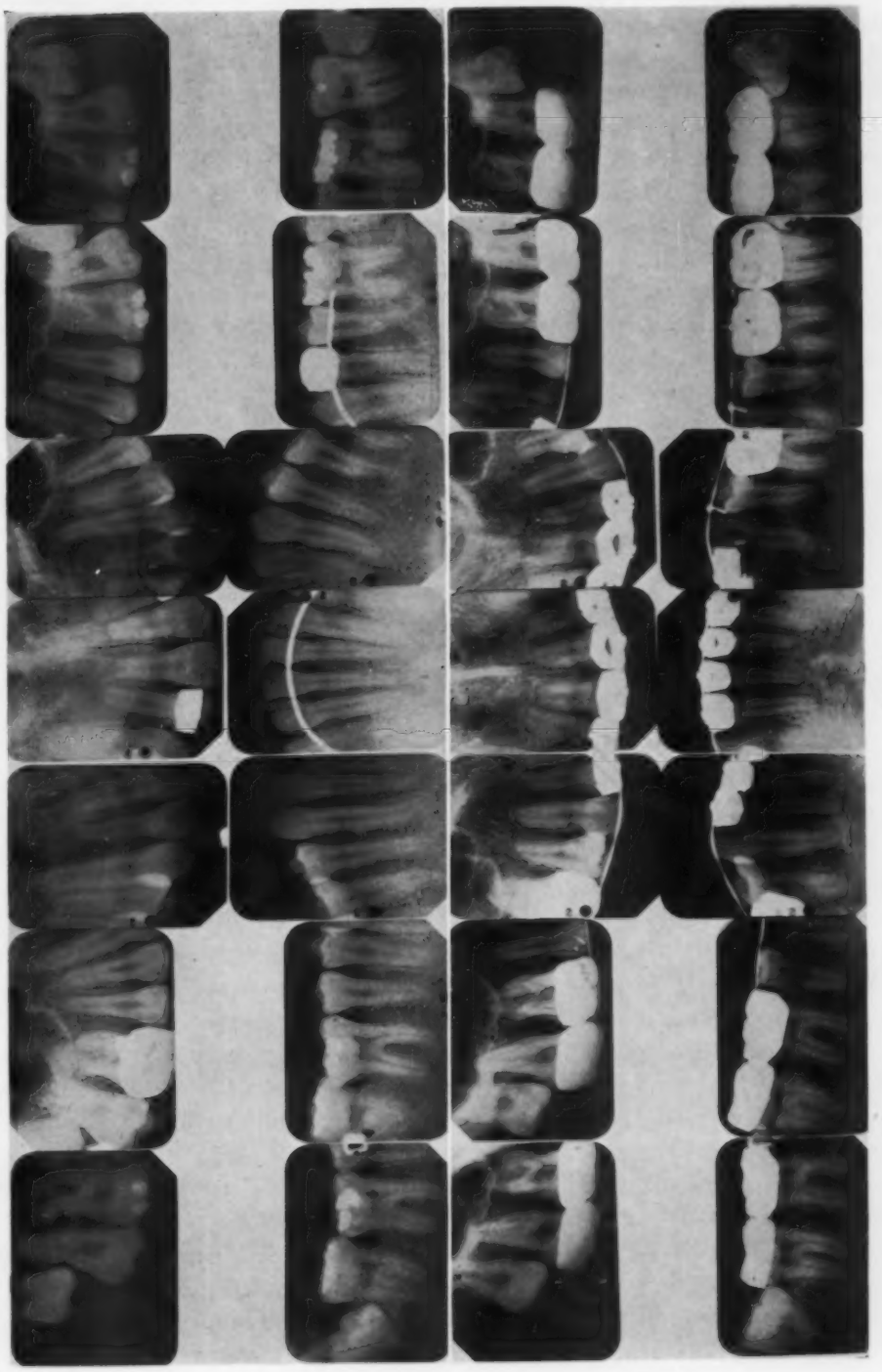

Fig. 3.

Fig. 4.

In contrast to the foregoing, may I present two typical x-ray series of patients with hypothyroidism who have received no orthodontic treatment. This patient (Fig. 5) is now aged 14 and has been receiving thyroxin since the age of 3. He has had *no* orthodontic treatment. May I point out the generalized nature of his resorption. He was not considered a good risk for orthodontic therapy because apparently the administration of thyroxin did not suffice to correct the derangement of his mineral metabolism. Fig. 6 indicates a patient who has received sporadic therapy consisting of thyroid extract and calcium compounds for a period of three years. Here, the incidence of resorption is scattered and uneven in degree.

A third observation on this type of case may be of interest. I have treated one patient who has been under thyroid medication since the age of 18 months. Treatment involved the removal of 4 first premolars. The radiographic examination indicated no visible sign of resorption of any of the teeth.

These observations are offered to illustrate what is more specifically discussed in Becks's paper referred to previously, namely, that the nature and effects of metabolic disturbances upon the roots of the teeth vary widely and that each case must be appraised with this basic thought in mind.

In examining radiographs showing resorption, one often observes that the root of a single-rooted tooth appears to have been sliced off, sometimes at right angles to the long axis of the tooth, and at other times diagonally. This type of resorption is much more likely to be the manifestation of a response to pressure in a given direction than is the type of resorption which is irregular in outline, as if the apex is being eroded away irregularly. Henry and Weinmann have said, "Resorption occurs more readily upon surfaces which are facing toward the direction of physiologic movement." A study of a number of radiographs leads me to state that resorptions of the pressure-response type vary similarly in location and extent. For instance, in some extraction cases, the apex of the cuspid which has been moved into the space shows blunting or diagonal resorption. This is probably due to contact with the cortical plate of the canine fossa. I am reinforced in this opinion by the following statement from Dr. Robert H. W. Strang, "I believe that root resorption occurs most frequently when roots are forced into contact with the cortical plate of the alveolar process."

Another type of resorption which follows this pattern has been observed in examining the roots of lower molars where excessive tip back force was applied. In these cases, the distal root exhibits shortening. This has occasionally been seen on the distobuccal root of upper first molars as well.

The next illustration (Fig. 7) was kindly offered by Dr. Brainerd Swain and is shown because it illustrates a number of the foregoing statements. The history is one of classic orthodontic treatment resulting in a double protrusion which was subsequently corrected by the removal of 4 first premolars.

It must be kept in mind that many buccal and lingual resorption areas are not observable radiographically. These are usually shallow, and repair takes place when the cause is removed.

Although I have usually found the position of teeth with apical resorption to be stable, one exception stands out in my mind and there I was convinced of

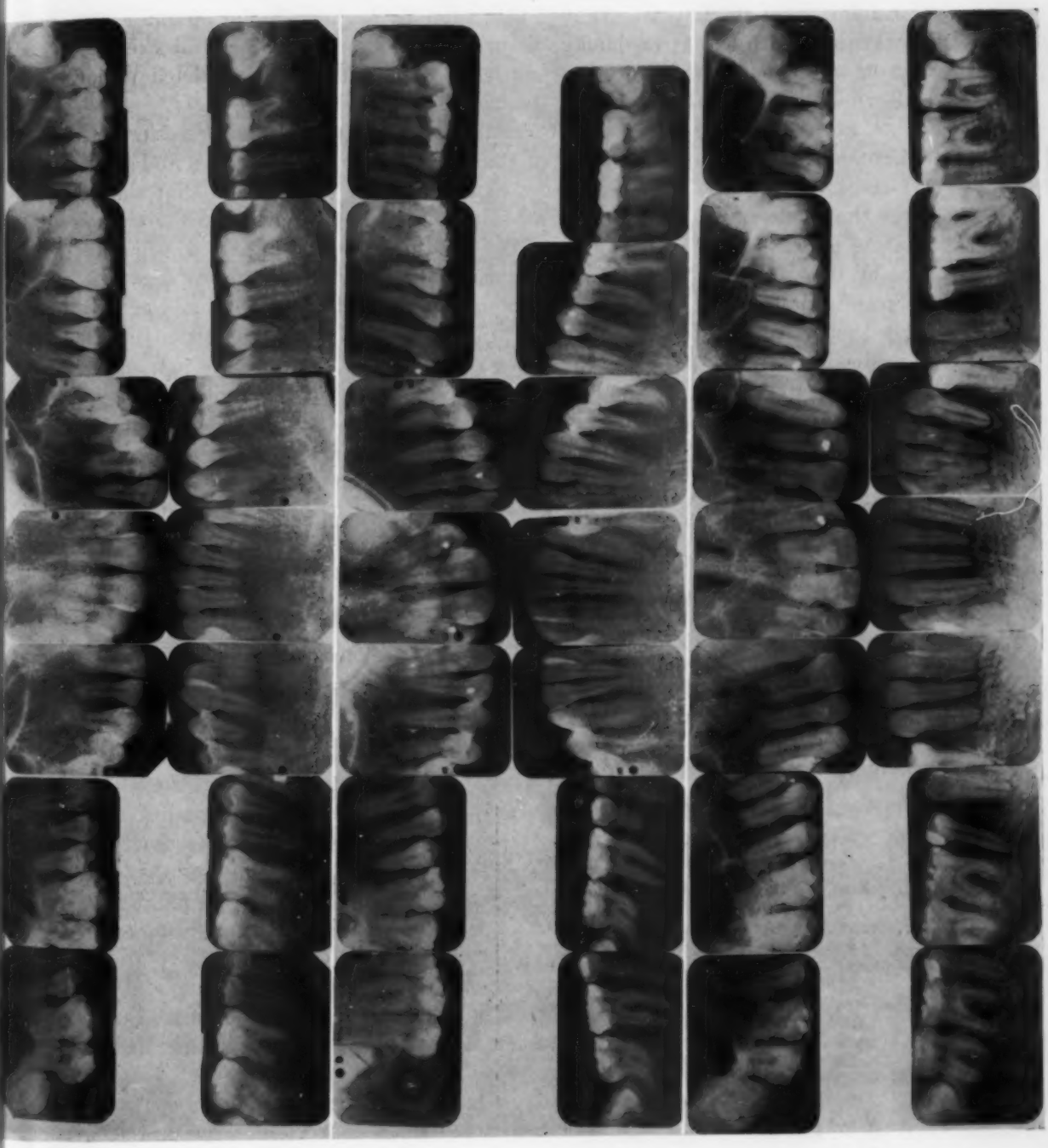

Fig. 5.

Fig. 6.

Fig. 7.

a systemic factor. Unfortunately, although the patient was referred for medical work-up, he did not go. May I urge that all radiographs should be carefully scrutinized at the beginning of treatment, and that periodic spot checks should be made during treatment so that if resorption is beginning, the operator can be warned before extensive damage occurs. In these cases, a medical checkup may be of great value. Carman[5] reported a case which was completed under endocrine therapy with no further damage.

A word regarding the possible correlation between type of malocclusion and resorption. I have seen resorption in Class II cases, open-bite cases, and Class III cases. It has also occurred in my hands in Class I cases, and that should cover the whole range. The forces we employ may be acceptable to the tissues of some patients but not all. Just as the operator must be guided to some degree by the variations in speed of response and in pain tolerance, so also must we keep in mind that the mineral metabolism of our patients varies, and accordingly their predisposition to root resorption. Where the predisposition is due to medically provable pathology, it is our responsibility to direct the patient for systemic treatment. On the other hand, in the absence of verifiable pathology, our therapy should be modified to fit within the limits of tolerance of the patient's tissues.

A last quotation: "Finally, the most encouraging thing of all is that the prognosis of teeth whose roots have resorbed during orthodontic treatment is most favorable. The teeth remain firm, vital to all tests, and do not change color or feel different to the patient from other teeth." (Steadman.[6])

This paper may have created concern in the minds of some and complacency in the minds of others. The purpose of the presentation was not to create either but to present a factual résumé of the situation as the profession views it today. Root resorption has been termed one of the scars of orthodontic treatment. In handling any living tissue, some alteration of it is inevitable. By adding to our knowledge, we can reduce the potential damage and increase the benefit of orthodontic treatment for our patients.

May I express my sincere thanks to all who have cooperated in this study.

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PRACTICAL LABIOLINGUAL APPLICATION

WILLIAM H. OLIVER, D.M.D., NASHVILLE, TENN.

THE healing arts include so broad a field that it is essential to divide it into many branches. One of these various ramifications is the study and practice of dentistry. This again must be divided into smaller divisions, one of which is orthodontics, which in itself is so complex that no one person may thoroughly explore all interrelated sciences.

Studies and research experiments are being made in many fields such as physics, physiology, histology, genetics, gnathostatics, cephalometrics, and others, in an attempt to correlate all this data, aiming in one principal direction—practical application. The practical application of the labiolingual technique is based on the great deal of experimentation and research carried on by many. Consequently the opinions expressed herein are compiled and assembled from many.

Unfortunately, in orthodontics today there is too much emphasis on which "appliance" is best in orthodontics. Certainly there are many excellent types of such appliances and nearly all are very similar in design and function. With few exceptions every so-called "technique" employs a labial arch of some form, whether it be the twin wire, universal, "round" labial arch wire as considered in this technique, edgewise, or otherwise. The lingual arch appliance is also used in nearly all techniques in one form or another, whether it be the soldered or removable, one piece or sectional, wire or acrylic type of lingual arch appliance. No honest appraisal at this time can deny that there must be a place in orthodontics for all of these variations if practical application is proving each one to be of value in successful orthodontic treatment. Only time can prove this since no man at present can answer whether certain so-called philosophies will stand this severest of all tests.

A rather intense study of orthodontic history will teach us that there is no "modern appliance or modern application of appliance therapy." There are constantly changing ideas, materials, approaches, and appliance forms being presented. This is desirable and necessary since orthodontics is far from being a mature science. There is certainly no place in orthodontics today for "closed" study groups in which orthodontists with differing opinions are excluded. Such is the Communist system. Broad discussion and mixing of ideas profits all.

Reasonably successful orthodontic treatment today is being undertaken by many through the use of the labial arch appliance in conjunction with a lingual arch appliance. There are certain fundamental rules of anchorage and construction which must be followed to gain these results in my hands. These may be more clearly exemplified by aid of illustrations included herein.

Anchorage in orthodontics is of utmost importance. It is defined by Webster as "a secure hold sufficient to resist a heavy pull." Since we are

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dealing with living and constantly changing tissues there can be no "secure hold"; therefore anchorage is better defined as a relative resistance to an applied force. When dealing with this subject one must realize the many factors involved. These are numerous and cannot be discussed in so brief a treatise.

Anchorage and stability are successfully employed in the labiolingual technique. Too often papers are so engrossed in theory that they lightly skip over the very elementary but essential steps in practical application. It is true that no practicing orthodontist should be guilty in his own office of any such procedure but, unfortunately, many are doing so. Many of the schools themselves are so engrossed in expounding theory and background that their students graduate without having a sound foundation in basic principles and technical procedure. This observation is not based on hearsay or prejudice but on actual personal discussion and observation.

Molar band construction is certainly fundamental and necessary, and yet discouragingly few seem to be masters of this art. Poorly fitting bands cause insecure attachment and may be compared to a foundation under a house built on loose sand without stability.

Since principal attachment is usually made to the first permanent molar teeth, these are often referred to as the "anchor" teeth. This is a misnomer since these molars are merely a component part of total anchorage. The bands should be individually constructed so that they will always rest in one position alone when seated with a band driver.

The half round tube should be approximately centered mesiodistally on the lingual surface of the tooth parallel to the long axis of the tooth. The round buccal tube should be at right angles to the long axis of the tooth. This positioning of these tubes will give best resistance to forces or torque or leverage from any direction (Fig. 1).

The lingual arch appliance as used in our offices is of semirigid material and may be likened to a battleship which is the stable platform for the guns which do the desired work even as auxiliary springs accomplish the desired movement of dental units. Nearly all platform bases are constructed with four supports for best stability with least bulk. The lingual arch appliance should be constructed in a similar over-all design rather than an outline similar to that of a horseshoe. The bends should be rounded right angle bends usually in the cuspid region. As many dental units as possible should be contacted to increase anchorage and stability (Fig. 2). Occlusogingivally the arch wire should be in a single plane in order to neutralize torque effectively (Fig. 3).

A labial arch should always be used with a lingual arch. It is used to reinforce anchorage and also to control movement of the anterior dental units. Again the importance of placement of tubes for maintaining collinear and coaxial balance is emphasized. The labial arch usually contacts only the incisor and cuspid teeth so that allowance will be made for individual tooth movement and lateral growth and development. This is just as true when using the twin wire labial arch as when using the round labial arch (Figs. 4 and 5).

Careful basic fabrication of the aforementioned units in the labiolingual technique is the most important and usually the most abused or misunderstood part of successful treatment with these appliances. Auxiliary springs and activation of allied component parts of these appliances vary with each individual case and thus cannot be discussed at this time.

Fig. 1.

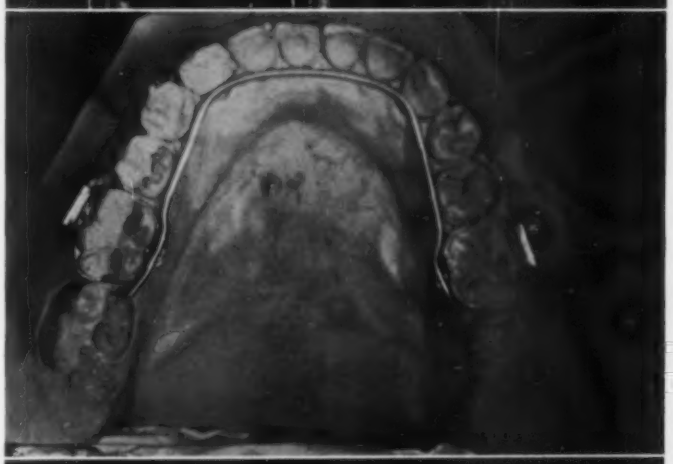

Fig. 2.

Fig. 3.

One of the outstanding auxiliaries employed more and more widely by successful practitioners using the labiolingual technique is the occlusal guide plane. It is not an appliance in itself and is certain to fail without properly constructed and understood labial and lingual arch construction.

The purpose of the occlusal guide plane is to obtain a change in the structural relation of the oral cavity and to aid in the establishment of a correct anteroposterior relation of the teeth and arches. The occlusal guide plane is

not a bite plane and should not be misconstrued as such or called by such a misnomer. It is *not* constructed so as to permit direct continuous contact with the mandibular anterior teeth when in occlusion and during motion. It *is*, however, constructed so as to interfere with attempts to occlude in previous malrelation and so as to guide the mandible forward to a predetermined position more nearly approaching normal occlusion. The presence of this appliance in the mouth permits with absolute freedom any coincidental mechanical therapy desired.

Fig. 4.

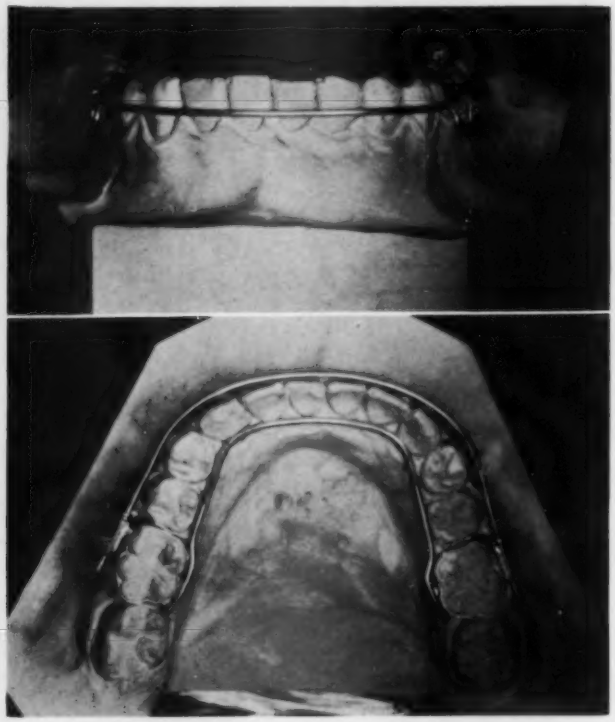

Fig. 5.

No attempt will be made here to include actual construction of the occlusal guide plane since this has been rather extensively discussed in other articles. Repetition is used to emphasize that it is constructed so that the mandibular incisors do not engage it forcefully but must slide anterior to the plane when the jaws are brought together (Figs. 6, 7, and 8).

The occlusal guide plane should rest on the lower lingual appliance while very slightly anterior to it and engage it from cuspid to cuspid when the teeth are in occlusion. When properly constructed this plane does not carry any force of occlusion when the teeth are together (Fig. 9). The posterior teeth are usually out of occlusion when the mandible is guided forward. This allows release from intercuspid interference and immediately eliminates this serious obstacle. The premolars and molars are thus allowed to erupt and meet in normal relation (Figs. 10 and 11). A properly constructed occlusal guide plane has several advantages over all other types of inclined planes. It is a fixed

removable appliance and cannot be removed by the patient. Herein is a chief reason for much better results than other types. The removable plane may be likened to removing a splint every week while trying to gain permanent knitting of a fracture. The occlusal guide plane is not bulky as are the acrylic type

Fig. 6.

Fig. 7.

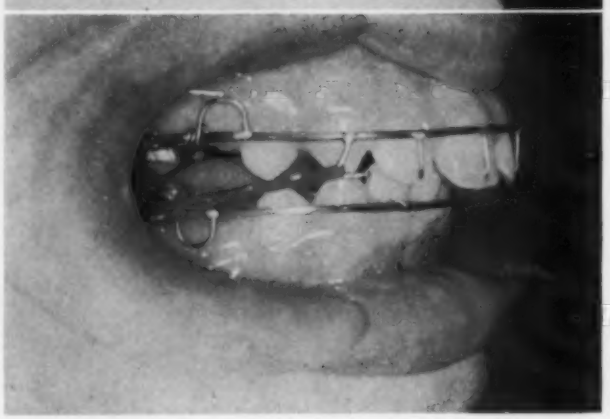

Fig. 8.

appliances. These latter inclined planes must be of sufficient bulk and are too shallow, thus allowing dual bites. One occlusion and one only is permitted by the occlusal guide plane. Other numerous advantages are evident for individual cases of malocclusion.

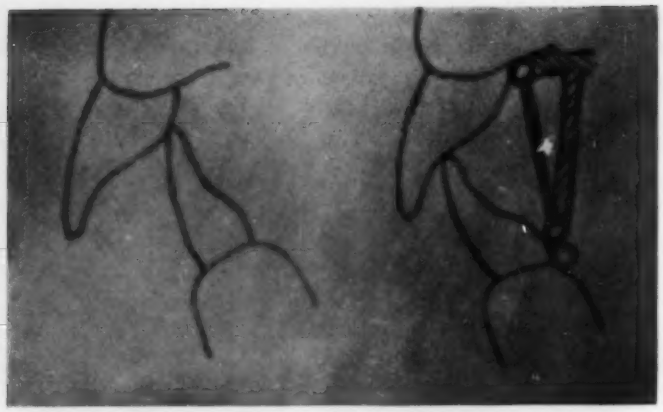

Fig. 9.

Fig. 10.

Fig. 11.

Lunsford and Terry have been making scientific investigation to determine exactly what changes take place. Early findings show the following: When the occlusal guide plane is placed in the mouth the heads of the condyles move downward and forward out of the glenoid fossa against the eminence to a lesser degree but similarly to opening the jaws. Progressive x-ray pictures show the condylar head again in the fossa with the new occlusion relation established still true. This would strongly indicate growth along the entire posterior border of the mandible, which remains an active growth center into early adulthood and especially in the neck of the condyle. Some change is certainly made in the glenoid fossa as Breitner demonstrated on monkeys. This clarifies how permanent change is made.

The occlusal guide plane is not a panacea; however, it would be nearly impossible for me to enjoy any measure of successful practice without using it.

The uses and limitations of the occlusal guide plane have been pointed out in other papers and in *Labiolingual Technique* by Oliver, Irish, and Wood. They are too numerous to mention here. The occlusal guide plane will, however, generally facilitate treatment of Class II, Divisions 1 and 2 cases, and certain Class I cases with decreased vertical dimension and mesial drifting of molars and premolars. Intermaxillary elastics are nearly always used in conjunction with an occlusal guide plane. Preliminary cephalometric reports from William Brandhorst indicate probable distal movement of all maxillary dental units. This would support discouragement of extraction of one or more dental units in treatment of many cases.

The success of any orthodontic appliance is dependent upon its correct usage and fabrication in accordance with the particular purposes for which it was designed. Failures of appliances may usually be attributed to: misunderstanding of construction, ideas that they are simple and foolproof, changes made for supposed improvement which absolutely defeat the original purpose for which they were designed. Carefully thought-out and planned changes and additions are desirable. Everything can be improved! Nothing is perfect!

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1915 Broadway.

ORTHODONTIC AND SURGICAL CORRECTION OF A CLASS III MALOCCLUSION

Report of a Case

Charles S. Adelstein, D.D.S., Cleveland, Ohio

THE development of surgical correction of Class III cases in recent years has made it more interesting for the orthodontist to handle mandibular prognathism. Treatment of patients in this classification is really just coming to the fore, and represents a closer cooperation between two fields of specialization, oral surgery and orthodontics.

There are several causes that bring patients to our offices seeking our services; two of them are facial disharmony and irregularities of the teeth. In Class III malocclusion there is no doubt that both factors are involved and almost all patients with mandibular prognathism will try anything to attain a normal facial appearance and without the expectation of the degree of permanency of occlusion as in Class I or Class II patients. The case I am presenting is that of a boy 20 years of age, very indifferent and unhappy with his station in life and society (Figs. 1 and 2). He was rejected by the Army for enlistment and during the draft registration about two years ago he was also in the so-called 4F classification. He was referred to me with the hope that something could be done for him. Clinical and roentgenographic findings were somewhat discouraging as the oral condition was neglected early in life. Many teeth were missing and an extensive amount of restorative work was necessary before any orthodontic treatment could be started.

It was further complicated by the absence of all lower molars. The object of treatment in this case was to obtain facial esthetics with a fairly normal occlusion (Figs. 3, 4, and 5). In this case this objective was impossible to obtain by orthodontic means only. It was then obvious that a combination of orthodontics and oral surgery was advisable. The oral surgeon was consulted and it was decided first to align the teeth in the upper jaw, close some of the spaces of the missing teeth so that when the mandible was resected the teeth in the anterior section of the mandible could be occluded with its maxillary opponents.

Edgewise bracket bands, with mesial and distal staples on each band placed occlusally, were cemented on all teeth except the upper molars. These carried edgewise buccal tubes. There were no lower molars present. Stainless steel round arch wire of 0.016 inch followed by 0.018 inch and 0.020 inch with necessary stops and auxiliaries was used to level off, rotate, and align the teeth according to a predetermined arch form. When this was accomplished an 0.021 inch by 0.028 inch arch wire was fashioned and inserted. A scratch mark was made on the arch wire approximating the contact point of

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each tooth, the arch wire removed, and a wire one-eighth of an inch long was soldered gingivally to the maxillary and mandibular arch wires, reinserted and tied to place. After both arch wires were in place the patient was turned over to the oral surgeons, Dr. I. F. Kammen and Dr. E. V. Linsey, of Cleveland (Fig. 6). On Sept. 5, 1950, the osteotomy was performed. I am sure that you will be as interested as I was in the surgical procedure in the handling of this case, and I will therefore give you some of the high lights.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

An incision was made through the skin about 1 cm. long over the posterior border of the ascending ramus of the mandible midway between the lobe of the ear and the angle of the mandible. An aneurysm needle was inserted through the incision and passed under the mandible until it passed through the sigmoid notch. The soft tissues and skin were elevated as soon as the needle passed through the notch; a second skin incision was made and the aneurysm needle was forced through. A Gigli saw was attached to the end of the needle with stainless steel wire and the needle withdrawn, pulling the saw through under the mandible and through the original incision. The bone was then cut through, the saw was withdrawn, and the skin incisions sutured. The same procedure was followed on the other side of the face, leaving the

mandible freely movable. The mandible was moved distally, occluded with the maxilla into a normal position, and immobilized with up and down elastics attached to the hooks soldered on the 0.021 inch by 0.028 inch arch wires

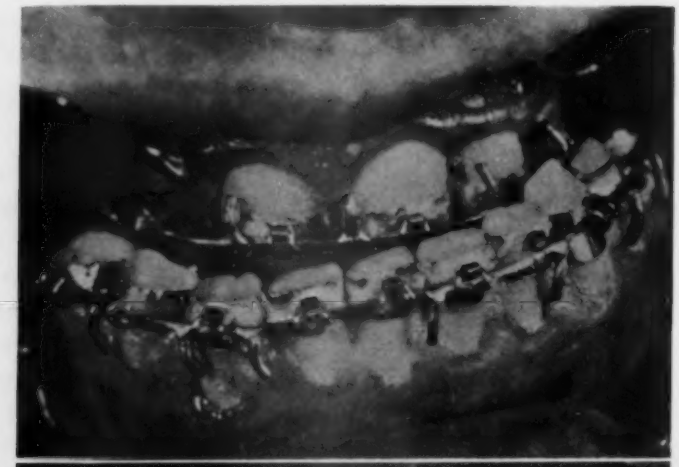

Fig. 6.

Fig. 7.

Fig. 8.

(Fig. 7). The postoperative course was uneventful and the patient was sustained on a high caloric and high vitamin liquid diet. The immediate postoperative x-rays show the short fragments displaced laterally and overriding

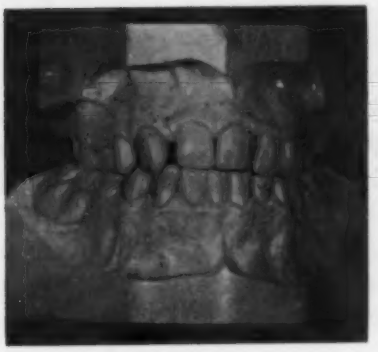

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

the ascending ramus. After six weeks of immobilization the ties were removed and the mandible allowed to function. Intermaxillary elastics were placed only in the posterior region for an additional two weeks to assist the mandible to return to the occlusion established by the surgery. The patient was dismissed and referred to his dentist for a necessary partial denture in the lower jaw instead of retainers. Six months after the surgery was performed the clinical and radiographic examination revealed an improved facial appearance with a normal function and occlusion (Figs. 8, 9, and 10) a good vertical opening with the ability to move the mandible in both left and right lateral excursions. Roentgenograms also showed that bony union had taken place. The heads of the condyles were functioning normally in the glenoid fossae.

After the successful osteotomy the patient was so pleased that he notified the local draft board and requested re-examination and was reclassified (Figs. 11 and 12). Both Uncle Sam and I owe thanks to Dr. Kammen and Dr. Linsey for rehabilitating this patient to a normal and useful life, as he is now serving in the United States Army.

929 Rose Bldg.

SUPERNUMERARY TOOTH IN THE ANTERIOR SECTION OF THE MAXILLA

Report of a Case

Charles S. Adelstein, D.D.S., Cleveland, Ohio

SOME TIME ago, I reported a case of supernumerary teeth in the premolar region of the mandible. Now it is my pleasure to present another case involving a supernumerary tooth in the anterior section of the maxilla. Personally, I have found more cases of supernumerary teeth in the anterior region than in the posterior region.

CASE REPORT

This patient, a 10½-year-old boy, was referred to me by his dentist on Dec. 6, 1947. The parents were very much concerned, and wanted something done for him. He was developing an inferiority complex, seemed to get into all kinds of difficulties, and was teased unmercifully by his friends and school mates (Figs. 1 and 2).

The clinical examination revealed the presence of a supernumerary lateral incisor on the right side of the maxilla. Otherwise the teeth appeared to be in good condition and with very few restorations (Figs. 3, 4, 5, and 6). Roentgenographic examination confirmed the clinical findings.

The x-ray and the well-formed crown of the lateral incisor which was lingual in occlusion led me to believe that the supernumerary lateral incisor was in the line of occlusion. The x-ray film also revealed the root to be well formed and led me to choose the road of least resistance. I, therefore, ordered the removal of the normal-appearing right lateral incisor, which was lingual in occlusion.

The distal relationship of the mandibular arch to the maxillary arch, the relationship of the first permanent molars, on each side, to each other, the deep overbite with the mandibular incisors occluding with the soft tissues of the palate, all these manifestations and the profile of the face led me to decide to plan my treatment of this patient as a Class II, Division 1.

Procedure of Treatment.—As the edgewise arch mechanism is most efficient in my hands, I therefore made and cemented to place edgewise bracket bands on all the teeth in the mouth that were present at this time, with the exception of the first permanent molars. The molar bands carried edgewise buccal tubes. Mandibular and maxillary 0.016 inch stainless steel arch wires were constructed and inserted to level off and acquire bracket engagement. This was followed with an 0.018 inch round wire with tip back bends to begin uprighting the molars. On subsequent appointments, the 0.018 inch arch wire

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was followed by an 0.020 inch round wire with a vertical Strang loop incorporated between the canine and the first premolar bracket, and stop loops about one-eighth of an inch mesial to the buccal tubes on each side of the maxillary arch wire were constructed and inserted.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

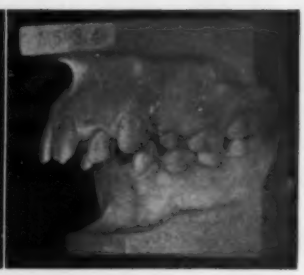


Fig. 5.

Fig. 6.

The Strang loops on these arches were activated gradually by means of 0.010 inch steel ligature wire tied around the buccal tubes and the stop loops. This procedure was followed in the maxillary arch until the axial inclination of the maxillary incisors assumed a normal appearance and the loss of con-

tact was entirely reduced. This was then followed with an 0.021 inch by 0.028 inch rectangular stabilizing arch wire with lingual incisal torque and mild tip back bends. Tiebacks were also soldered to the maxillary rectangular arch wire before insertion and ligated into place.

Fig. 7.

Fig. 8.

Fig. 9.

Fortunately, the lower arch in Class II cases is usually characterized by teeth that are more or less regular in alignment and in fair relationship to the body of the mandible; therefore, by the use of 0.016 inch, 0.018 inch, and

0.020 inch round stainless steel arch wire the mandibular arch was readied for anchorage preparation long before the maxillary arch was ready for the rectangular stabilizing arch wire.

At the same appointment when the 0.021 inch by 0.028 inch arch wire was inserted and ligated into place in the maxillary arch, an 0.021 inch by 0.025 inch resilient arch wire, incorporated with lingual torque in the incisal segment, mild tip back bends in the buccal segments, and intermaxillary hooks for Class III elastics was inserted and ligated into place in the lower arch.

The intermaxillary hooks on the mandibular arch wire were soldered gingivally, anterior to the canine bracket on each side.

No tiebacks were used in the mandibular arch wire during anchorage preparation as it is obvious that to do so would prevent the crowns of the anchor teeth being tipped distally. Distal tipping is desirable for the anchorage preparation in the mandibular arch.

Having both rectangular arch wires in place, with second order bends and lingual torque incorporated in these arches, Class III elastics were instituted until the lower posterior teeth were in slight distal axial inclination developing toe hold anchorage to help resist forward displacement when Class II elastics are used at a later date.

The patient used Class III elastics for a comparatively short time and the 0.021 inch by 0.028 inch stabilizing arch wire with approximately the same amount of torque and second order bends as in the resilient arch wire that was removed. Tiebacks were soldered to the stabilizing mandibular arch wire. From now on the stops will be used for ligating to the lower buccal tubes as it will be most advantageous to use the mandibular arch set up as a whole unit when Class II elastics will be used.

An 0.021 inch by 0.025 inch resilient rectangular arch wire with second order bends, lingual torque in the incisal area, and intermaxillary hooks for Class II elastics is now constructed and inserted in the maxillary arch. Class II intermaxillary elastics were used continuously from this stage on with necessary alterations in the arch wires, usual in this type of case, such as increasing torque and second order bends and new arch wires from time to time until the normal relation between the jaws had been established and treatment completed.

All bands were removed and an acrylic Hawley type retainer, with a bite plane and anterior wires on the labial of the incisors, was inserted and the patient instructed in its use.

This case was selected for this presentation because of its unusualness rather than for the perfection of the results obtained. In fact there are many spots where one can readily see that better results could be attained if more time was spent on the case.

929 Rose Bldg.

REMARKS ON THE PRESENTATION OF THE ALBERT H. KETCHAM MEMORIAL AWARD, 1952, BY STEPHEN C. HOPKINS, PRESIDENT OF THE AMERICAN BOARD OF ORTHODONTICS

Dr. McCoy, Directors of the American Board of Orthodontics, Members of the American Association of Orthodontists, and Guests:

Today we are honoring one who followed closely on the heels of the pioneers of modern orthodontics. He has passed through the turbulence and has weathered the storms of the past forty-six years of orthodontic history; extractions, nonextractions, extractions again; expansion, nonexpansion; headcaps, no headcaps, headcaps again; early treatment, nonearly treatment, modified, deferred, and limited early treatment; a John Hunter, an Edward H. Angle, a Calvin S. Case, and now, our modern investigators.

Few are they who are permitted to stand stanchly among such men and their ideas, and to pursue, with such a rare admixture of judicial calm and youthful energy, the course which they have followed. But sitting here, smiling, robust in mind and body, our Jim is one of these few, one who exemplifies the beginnings, the struggles, and the progress of modern orthodontics. He knew intimately the pioneers and their works. But he tarried not in the effulgence of their glory. Directly upon graduation from his beloved Southern California in 1906, he plunged into the thick of the fray and eventually carved for himself a shining niche in the Orthodontic Hall of Fame.

Dr. McCoy's history may surprise some, who, in the American tradition, are prone to see their heroes rise from obscurity and struggle upward to success. But Dr. McCoy is not of that breed of heroes. His father and his grandfather were pioneer dentists. He is also descended from Methodist and Presbyterian clergymen of distinction. Thus, by inheritance, by family association, precept, and example it is natural for him (and for his brother John) to be interested and immersed in scholarship and religion, in the active cultivation of the arts, and in dentistry. Scottish ancestors no doubt contributed the ever-present Bobbie Burns' sense of humor, the fighting qualities of a Wallace, the oft-recurring righteous indignation of a John Knox, and the stubborn, undeviating, grim determination of the kilted highlander. (Not wishing to incur the enmity of those sons of Erin who may be present, I acknowledge that there may be a drop or two of the blood of the old sod within the McCoy vascular system.)

We should not be surprised that, with such an illustrious background, Jamie already at the age of 16 announced that he was going to be an orthodontist. Not wasting any time, Dr. McCoy in 1907 visited the office of Dr. A. H. Ketcham, of Denver (in whose honor the Ketcham Award was founded), and with this visit inaugurated a friendship from which he received much inspiration and help. Dr. Ketcham was the first orthodontist in the United States to install his own x-ray laboratory; and from the example set by him, Dr. McCoy in 1908

Presented at the meeting of the American Association of Orthodontists, St. Louis, Mo., April 22, 1952.

equipped his own office with this indispensable aid and thereby became the second orthodontist in the United States to install x-ray equipment. He was also the first member of the dental profession west of the Rocky Mountains to add the x-ray to his diagnostic armamentarium. Years later he was among the first to use the cephalometer.

We are not surprised that Dr. McCoy at the earliest possible moment joined the American Society of Orthodontists and that, after serving in many capacities, he finally became its president in 1937. He helped to organize the Pacific Coast Society of Orthodontists and served as one of its presidents. Quite naturally, he became a professor of orthodontics and was for twenty-eight years on the faculty of the College of Dentistry of the University of Southern California. He was a member of the Board of Directors of the General Alumni Association of his alma mater and became its president in 1928. He was the editor of the *Southern California Alumni Review*. He is an Associate Editor of the AMERICAN JOURNAL OF ORTHODONTICS.

Dr. McCoy is the author of two textbooks: one, *Dental and Oral Radiography*, has gone through three editions; the other, *Applied Orthodontics*, is now in its sixth edition. He has written more than one hundred papers. These have been delivered before many orthodontic gatherings and published in many orthodontic and dental magazines. Fifty of them appeared in the AMERICAN JOURNAL OF ORTHODONTICS.

In 1936 Dr. McCoy was awarded the Asa V. Call Achievement Trophy which is given annually to the alumnus of Southern California who, in the judgment of its officials, has brought the greatest honor to his alma mater during the year. Loyola University of Los Angeles conferred upon him the degrees of Bachelor of Science in 1919 and Master of Science in 1920. In 1929 he collaborated in the movement which brought into being the American Board of Orthodontics. In 1939 he was appointed as a director of that organization to fill out the unexpired term of Dr. B. Frank Gray who had passed away. Later, in 1940, he was elected for the full term of seven years. At the 1950 meeting in Chicago his tenure of service in the organization was automatically terminated. Lately, having nothing much to do, this energetic young man of 67 summers engaged in the project of building himself a beautiful new home and office in Beverly Hills. Remarkable? Not at all.

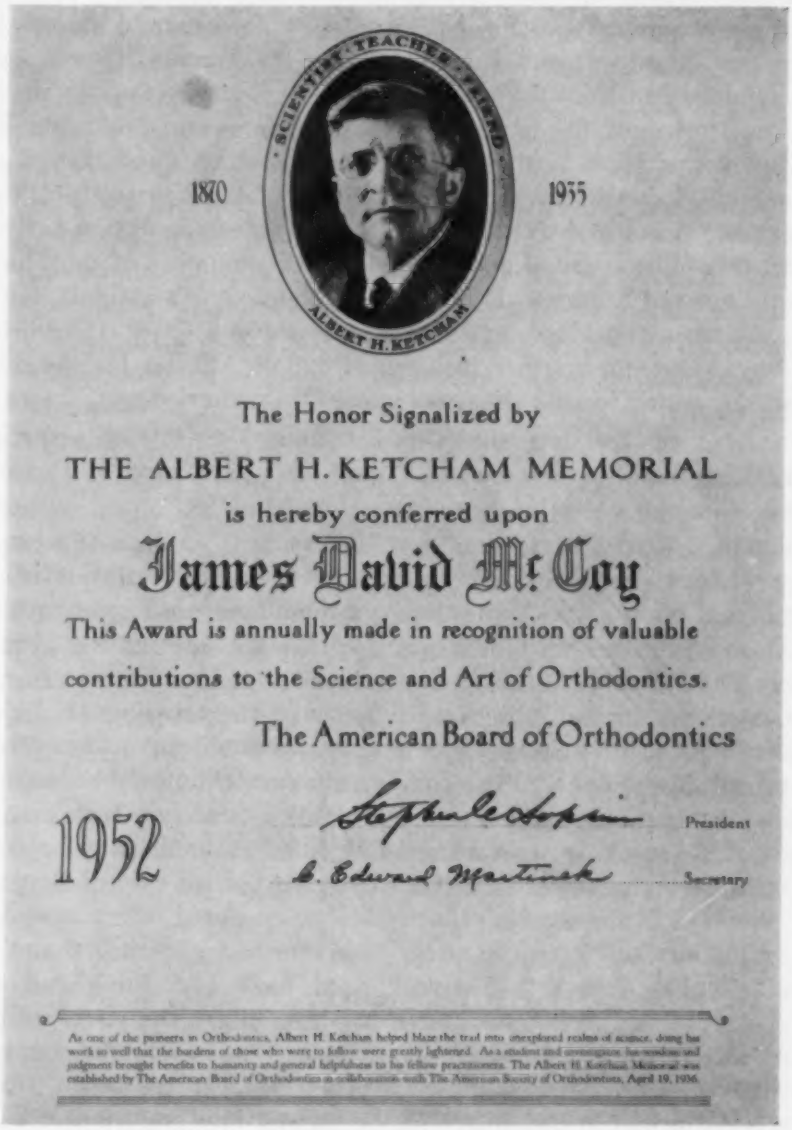
In a lighter vein, it becomes my privilege to extract from Jim's colorful past several anecdotes that may happily throw a stronger light on those qualities of his that have amused his intimates, enraged his opponents, delighted his admirers, and, above all, endeared him to those who know him best.

I shall tell the first in the words of Brother John, who related it to me:

"The Rose Bowl game, as you know, is the oldest of the bowl games. When Pittsburgh met U. S. C. in the early thirties, Jim was on the Faculty Athletic Committee at U. S. C., and Ned Friesell, Dean of the University of Pittsburgh Dental School, was the chairman of a similar committee at Pittsburgh. So when U. S. C. won the Coast Conference title and Pitt was outstanding in the East, the Committee at U. S. C., aware that Jim knew Friesell, asked him to phone his

friend and invite him to the Rose Bowl. So Jim casually lifted the receiver in his office and called his friend. Just as easy as that, these two bald-headed dentists arranged the big game attended by 90,000!''

Jim performed professional services for many famous people, including Bette Davis, Norma Shearer and her children, Gary Cooper's daughter, Harold Lloyd's and Joe E. Brown's children, and President Hoover's grandchildren.



THE KETCHAM AWARD

But he likes best to remember the little girl who came to him all the way from Alaska. According to Jim's gracious wife Katherine, this little girl was born close to the Arctic Circle, and, because of the northern lights and because the sun virtually never sets there, she had yet to witness a dark night until she traveled south. I shall continue the account in the words of Katherine McCoy:

"While visiting Fairbanks a former patient of Jim's became acquainted with the parents of the little girl and told them about Dr. McCoy's skill as an orthodontist. They realized only too well that their daughter was desperately in need of orthodontic treatment, but because of their modest circumstances, they did not know how they could find the means to send her far south for such treatment. How to get the money was the question. Now, those familiar with the Fairbank's region have no doubt heard of the 'Ice Lottery' which carries a purse of one hundred thousand dollars going to the one who guesses the exact day, hour, and minute when the ice breaks on the Tanana River. An electric device is established across the river to record the precise minute when the ice moves. The mother of the little girl spoke as follows to her husband: 'I am going to buy a two-dollar ticket and win the Ice Lottery; and then, I am going to send our child down to Dr. James McCoy to have her teeth straightened.' She bought her ticket and waited anxiously for the great day to arrive. Come it did, and this plucky young mother was among a number of persons who had all correctly guessed the same day, hour, and minute. As a result, the hundred thousand dollars was divided, and she was awarded $16,000. She brought the child to Dr. McCoy, placing her in a school in Los Angeles for the duration of her treatment, which in due time was successfully carried out."

Then there was the time when Jim entertained a party of ex-presidents of the A. A. O. on his beloved sailboat. I shall take the liberty of also presenting this anecdote in the words of Katherine McCoy:

"In 1938, following the meeting of the A. A. O. in Los Angeles, at which Jim as president, had presided, he took a group of orthodontists over to Catalina Island for the week end. Each of these men was a past president, and none of them had ever been to sea in a small boat. Catalina lies about twenty-five miles off the mainland, and at times the channel is unpleasantly rough. In order to conserve time, it was decided to make the crossing at night. Since there is little wind after sundown, the crossing would have to be made under power and would require at least four or five hours, unless head seas were encountered. After dinner, prior to which many a toast had been drunk to past presidents of the A. A. O., and a few to Father Neptune, the good ship *Mickey* headed into the night, toward a little harbor on the lee side of Santa Catalina Island. Well out in the channel, the *Mickey* encountered rough seas and pitched heavily in the swell. Several ex-presidents who had gone below and to bed in comfortable bunks found themselves tossed back and forth and unable to sustain the protection of bed and blankets. Except on the part of the skipper, who alone was an experienced sailor, nervousness was everywhere apparent. In addition to the darkness a mantle of fog settled over the ocean, leaving only the compass as guide for the ship. Watch was set fore and aft to guard against collisions with other craft, and speed was reduced as a precautionary measure. After several hours the fog lifted as quietly as it had gathered, and the moon shone brightly, lighting the pathway of the boat, and there, a few miles distant, could be seen the mountains of the island. Within a half hour or so the good ship found her way into the little harbor, the anchor was dropped, and a lot of nervous guests aboard breathed a sigh of relief. As a matter of fact, they were

so relieved and so grateful that a large jug was brought up from the galley, and several toasts were again drunk to Father Neptune for his protection and guidance through those perilous seas. The next day, the trip back to the mainland was not devoid of excitement, for the wind was coming from the port quarter so that the little yacht, when under way, heeled sharply to starboard. The landlubbers aboard could not understand why it was not in danger of capsizing, even though the skipper explained that such a thing could not happen. When the home port was reached and the sails were furled, one of the past presidents, a gentleman from either Missouri or Texas, exclaimed: 'Thank God we're here, but I never thought we would be!' Again the jug was brought out, and again Father Neptune was toasted far into the night."

When Jim was on the Board of Directors of the Alumni Association, he exhibited his talents as an executive. For the story I will quote from the account given me by Brother John:

"On the campus at U. S. C. is a wonderful bronze statue of the mythical Trojan. This statue was Jim's idea, His forceful campaign brought it into being as a symbol of the determination and fighting ability of our athletic teams, proven over the years. The name 'Trojan' was given to our teams years ago by a reporter for the *L. A. Examiner,* who was so impressed that he said, 'They fought like Trojans!'

"By the way, Jim's daughter was Vice-President of the U. S. C. Student Body at the time, and she unveiled the state at a very beautiful ceremony."

And now, Dr. Jim, I must apologize for exposing some of your most intimate "moments of history." Knowing your innate graciousness and your somewhat low opinion of pomp and circumstance, I am sure all will be forgiven. In composing a tribute it became quite impossible for me to restrict myself to the dignified style customarily observed in functions of this kind.

Humbly representing the American Association of Orthodontists and the American Board of Orthodontics, I do hereby tender to you, Dr. James David McCoy, this certificate testifying that these organizations, recognizing your remarkable record of service, your long list of contributions, your leadership, and your ever-ready helpfulness in all matters pertaining to your beloved specialty, have conferred upon you the Albert H. Ketcham Memorial Award in the year 1952.

RESPONSE BY JAMES DAVID McCOY TO THE PRESENTATION OF THE ALBERT H. KETCHAM MEMORIAL AWARD

President Hopkins and Members of the American Board of Orthodontics; President deVries and Officers of the Americian Association of Orthodontists; Fellow Members and Guests:

When the official notice reached me last August that this wonderful honor was to be bestowed upon me I was surprised beyond measure and when this reaction had subsided I felt deeply touched. When I had adjusted myself to this latest gesture of kindness on the part of my friends I grew nostalgic and relived, in my mind, some of the days and incidents when my associations with

Albert H. Ketcham were so close and so helpful to me. I truly think he was the greatest orthodontist I ever knew, for his greatness extended beyond the mere skills essential in our special field. Others also felt the same way and that is why the Award was established in his memory.

I do not know whether you realize it but it had its origin as a result of a number of conferences between the late Dr. B. Frank Gray and myself, following the passing of our dear and intimate friend. Others were called in and the movement gained momentum and the Award was established with the approval of the American Association of Orthodontists. We felt that in establishing it, meritorious effort for orthodontics would be stimulated and the memory of a great orthodontist would be kept green through the years.

In view of the foregoing facts and my intimate part in the events of that time, I felt a great surprise in being named recipient for I have always thought of myself as one of those in the mid-phase of life with promise of opportunity still ahead. Since any one of several were not chosen whom I considered more deserving than myself, my surprise led me to the conclusion that I had some very warm friends indeed in positions of decision. This has certainly turned out to be the case but who am I to question their motives or judgment.

In view of my early efforts toward establishing this Award I am now moved to recall the biblical admonition from the Book of Ecclesiastes which states; "Cast thy bread upon the waters; for thou shall find it after many days." Certainly the tides of good fortune have flowed in my direction today and have brought to me this emblem of your good will.

During my career it has been my high privilege to know upon friendly terms most of the great orthodontists who blazed the trail and made possible the present status of our specialty. Of these I might mention Dr. Angle and Dr. Case, Dr. Gilford, Dr. J. Lowe Young, and Dr. Pullen, Dr. Dewey, Dr. Robert Dunn, Dr. Grieves, Dr. Harry E. Kelsey, Dr. C. A. Hawley, Dr. R. C. Willett, Dr. Milo Hellman and, of course, Dr. Ketcham. There were others, of course, some of whom are still with us, while those I have mentioned have gathered upon the other Shore. These men possessed many fine cultural and scientific attainments and their devotion to orthodontics was unwavering.

The progress of any science witnesses many changes, some for the better and others which can hardly be termed progressive, but these usually lose their momentum with time and are discarded. There will always be disagreements among orthodontists but we are all grateful for the fact that now they can all get together under the same tent at our annual meetings and discuss their differences in a spirit of friendly tolerance.

Every so often we witness the introduction into our specialty of some method or procedure whose enthusiastic proponents either consciously or unconsciously look upon as being a panacea. They always remind me of the man who had a cello with a single string. He used to bow on it for hours at a time, always holding his finger at the same place. His wife endured this for some time but finally in desperation said, "I have observed that when others play that instrument there are 4 strings and the players move their fingers about

continuously." "Of course they have 4 strings and move their fingers about continuously," he explained patiently, "they are looking for the place, I have found it!"

Now I do not mean to disparage the one string cello players in our specialty for they have kept us on our toes and played havoc with the old reactionary spirit. We must therefore keep our minds open, our spirit of tolerance active, and keep all 4 strings on our own cellos attuned to common sense and hard work.

JAMES DAVID MCCOY

I have often thought what a wonderful thing it would be if we could call back the men I have mentioned, all of whom were strong in their convictions and in some instances not too friendly toward each other, and let them constitute a panel discussion at a meeting such as this. Doubtless some would have changed their minds, for certainly it is not just to say what a man would think now, just because he had strong ideas twenty-five or thirty or fifty years ago! Most of us have changed our minds and even our concepts of the orthodontic problem and who knows but what future experience will cause us to alter positions we

now hold. I for one have at various times been in danger of becoming a one string cello player only to be rescued before it was too late by the wise counsel of co-workers in this Association.

Perhaps I should conclude my remarks at this point but I fully realize that I may never again be placed before such a friendly audience and therefore I am asking your further indulgence to the extent of telling you a story. In 1665 a disastrous fire occurred in London and historic St. Paul's Cathedral was destroyed. Under the patronage of King Charles II, Sir Christopher Wren, the most famous architect of that period, was commissioned to rebuild it. One day as it progressed and he was inspecting construction details he came upon 3 workmen who were cutting stone. He was unknown to them so he asked each the same question, "What are you doing?" The first, a surly man, replied, "I am cutting stone!" The second man, who was almost equally as rude, replied, "I am working for 3 shillings a day!" but the third man laid down his mallet and with the light of inspiration upon his face said, "I am helping Sir Christopher build the Cathedral." Now you and I, in the great scheme of things so far as our profession is concerned, are but humble cutters of stone but we can, by our efforts cause a cathedral to be built, if judged by its benefits to children, whose lofty spires will reach the blue skies of Heaven itself. I for one am proud to be a humble cutter of stone and do my part in building and maintaining this temple, not made with hands, which we call orthodontics.

In accepting this coveted honor. I do so in humility and gratitude and give you my pledge that in future years I shall ever strive to live up to the precepts implied and do my part to safeguard the good name of orthodontics.

In Memoriam

ERNEST GAYNOR SLOMAN*

IN THE sudden passing from a heart attack of our honorary member, Dean Ernest Sloman of the College of Physicians and Surgeons on April 30, the dental profession has suffered a severe loss.

We in California who knew him best admired him for his sterling personal qualities as well as his keen analytical mind and sound judgment. For his extraordinary intellectual capacity, his wise counsel was sought in all fields of dentistry and which he contributed in generous measure.

He had occupied enough offices, served on enough committees, boards and councils to fill several pages, some we never heard of and no one person could know them all.

His interest in orthodontics was great, with always an alert ear for any news of our Society or its individual members with no detail too small for his attention.

At two of our general meetings including our last in 1951, he delivered eloquent addresses of welcome and in matters of legislation, he rendered valuable assistance to our Necrology Committee as well as rewriting the Code of Ethics of the American Dental Association.

The specialty of orthodontics and our Society in particular has lost a good friend whose memory we shall always cherish for we shall miss him indeed.

*Reprinted from the Bulletin of the Pacific Coast Society of Orthodontists.

Reports

REPORT OF THE MILITARY AFFAIRS COMMITTEE, AMERICAN ASSOCIATION OF ORTHODONTISTS, 1951-1952

THERE has been considerable activity on the part of the Military Affairs Committee during the past year. We have been able, by careful operation, to bring to the attention of all government agencies involved in the induction of dentists into the Armed Services, any inequities which have occurred. We regret to say, however, that we have not always had the complete cooperation of the orthodontists involved in a number of these cases. Unfortunately the problems of individual members of the A. A. O. never seem to be referred to this committee until time has become very short before government agencies are scheduled to take action. In spite of this, we have been successful in preventing a number of communities from being left without proper orthodontic care.

Since 1941, this committee has stressed continually the importance of considering the community before anything else. On numerous occasions we have been embarrassed by orthodontists who have applied for commissions as though they wanted to go into service immediately and who then have called upon us to keep them out of service for the protection of the community. This has put us in a bad light at times but we think we have been able to explain to everyone our sole object in handling these cases.

We do not consider it at all patriotic at the present time for an orthodontist voluntarily to leave a community where he is sorely needed and go on into operative dentistry with the Armed Forces where he is not specifically needed. We older men must endeavor to see to it that some of these younger orthodontists who are well qualified are not embarrassed because they are not in uniform. We know of cases where pressure has caused orthodontists to apply for commissions when they knew full well that they would be serving their country and community better if they remained in their present location.

We wish to make it clear to all orthodontists who may be in line for military affiliations that their Medical-Dental Procurement Boards and local Selective Service Boards should be well informed as to the exact situation which exists in each particular case. Then, if after recourse to them there is any question, the case should be referred to your Military Affairs Committee at the earliest possible moment in order that we can intelligently approach the problem and attempt to see that right prevails. The failure of orthodontists to follow this procedure has caused us to spend hours in telephone calls and letter writing in order to place the true picture before everyone concerned. Always, in asking aid or advice, be sure to give this committee full details including (1) your draft board chairman and head of the Medical-Dental Procurement Board, (2) any past military affiliations, age, and time spent in the practice of orthodontics, and (3) whether or not you received any part of your education at government expense.

Presented at the meeting of the American Association of Orthodontists, St. Louis, Mo., April 22, 1952.

In these uncertain times, we should all be on the alert for emergencies and try to be prepared to meet them as they develop with a thorough understanding as to the needs of the communities as well as the Armed Forces. We are glad to report that we have enjoyed the complete cooperation of many of our finest senators and congressmen and that they have given this committee support on every issue where its judgment has been questioned.

Usually by the time you read something in your JOURNAL, it is obsolete so far as what they are doing in Washington and what they may be required to do. We have operated cautiously in the interest of everyone concerned and any serious problem which may arise is no further away from this committee than the telephone because there are people in Washington who definitely lend an ear to our problems because of our honesty and they are willing to be of help at a moment's notice.

Respectfully submitted,

E. C. LUNSFORD, CHAIRMAN,
W. ROBERT MACCONKEY.

Department of Orthodontic Abstracts and Reviews

Edited by

DR. J. A. SALZMANN, NEW YORK CITY

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

Growth and Form. Editorial. *Brit. M. J.*, Feb. 24, 1951.

"It is usually assumed that a doctor has no difficulty in diagnosing when an individual is abnormal in size or in body proportions. This assumption has little scientific basis, for information about normal variations in the size of the body and its parts is limited, and such knowledge as exists is by no means widespread. Reliable standards of comparison are needed for a variety of purposes: for example, to judge if growth, which is a good index of health in children under everyday conditions, is following a normal course or not. Variation in the size of children of the same age is due to many factors, such as the socio-economic status of the family and differences in the rate of physiological maturity. Thus the growth of a particular child can be properly assessed only in relation to that of its own socio-economic group and after taking into account the stage of adolescence it has reached.

"The average stature of our male adult population appears to be unaltered, although maximum height is now reached at about 20 years old, compared with about 26 years in the nineteenth century. But children of today are taller and heavier than even 20 years ago. The cause of this is not clear, although an increase in growth rate, reflecting an improvement in the standard of living as well as unknown genetic factors, is probably involved. Post-war reports on Continental children show that not only were their average heights and weights lower during the war than pre-war but they reached sexual maturity later. . . .

"In the normally accepted sense of the word, growth ceases after physical maturity is reached. On the other hand, changes in form continue to occur because of changes in tissues of the body, such as fat deposition. Several anthropometric measurements reflect these various tissue changes—for example, the circumference of the calf is a good measure of muscular development. In contrast, the interpretation of measurements of stature and weight is complex. Classifications of human physique have been made since the time of Hippocrates. In this field of constitutional research a recent development of general medical interest has been the technique of somatotyping. The body is assessed for the development of three kinds of tissues—the viscera, or endomorphy; connective tissue, or mesomorphy; skin and nervous tissue, or ectomorphy—from standardized nude photographs, the development of each tissue being graded in one of seven groups. The standards for young adults have been fixed, and it is believed that bodies classed in the same somatotype change in the same way with age."

. . . . . .

"The technical problems of growth rate and relative growth have their biological importance too, and it happens that data on human growth are particularly suitable for analysis when detailed anthropometric measurements are available. . . ."

Über die Spätfolgen der Sechsjahrmolar-Extraktion (On the Sequences of Six-Year Molar Extractions): By Albert Pfyffer, Zurich, *Schweiz. Monatschr. f. Zahnh.* **61**: 565-590, June, 1951.

In a country where caries is so widespread as in Switzerland, it is natural that the extraction of six-year molars often becomes a necessity. It has been claimed that this measure represents a means of reducing the DMF rate by loosening up the dental arch, that it is an orthodontic measure to correct light cases of crowded front or side teeth, that it prevents difficulties of the third molars.

The paper represents a survey made on 130 recruits to military basic training, all 20 years old. They were selected out of 500 men and all of the 130 had previously had treatment in the dental clinic for school children of the city of Zurich. The general survey of the dental condition in this camp showed very satisfactory results when compared to results in armies of other countries. No recruit had to be rejected because of masticatory unfitness. Totals were: caries-free dentition, 0.18 per cent, restorations with good mouth hygiene, 60.4 per cent, caries with bad hygiene, 29 per cent, dentures, 3.9 per cent.

The examination of 40 men with extracted first molars and of 40 men without extractions consisted of: (1) a careful examination of restorations, (2) x-rays, (3) study models, and (4) photostat-pictures of front and profile.

The results are the following:

1. Extraction of six-year molars does not reduce caries susceptibility in the front teeth, nor is a crowding prevented, at least not in time.
2. Occlusal fillings: The group with extracted molars has a higher caries incidence on the occlusal surfaces.
3. MO and OD fillings: After subtraction of fillings in six-year molars no difference between the two groups. Same result with MOD fillings.
4. Class V fillings: Same result in both groups.

The general result shows no improvement in caries reduction by the extraction of first molars, and the DMF rate rather points against extraction. The paradental disturbances, by faulty articulation, call for critical judgment of this extraction practice. Third molar impaction is observed even after extraction of first molars. The photostat graphs do not reveal any disturbances in growth from early extraction. Differences from the biometrical norm in the profile are the consequences of irregularities in the relation of the laws before extraction. X-rays revealed, in many cases of extraction, deep recesses of the maxillary sinus, which predispose for chromical recidivating sinusitis. On the study models, the wandering of the teeth after extraction of first molars was observed and the claims of Baume confirmed.

Extraction of six-year molars with only slight caries incidence should not be practiced as an orthodontic measure. If the status requires extraction, the space of extracted first premolars will yield far better results. Six-year molars should therefore be sacrificed only if their destruction is such that an extraction is inevitable or anticipated as imminent.

R. H. Boitel.

Editorial Note: Salzmann,* in a series of studies (1935-1939) on the sequelae following first molar extraction in 500 boys and girls between the ages of 15 and 19 years, presented the following conclusions:

1. Loss of a central incisor produces mesial shifting of the lateral incisor and canine. While there may be spacing between the central and lateral incisors, the space is most frequently found between the lateral incisor and canine.

*Principles of Orthodontics, ed. 2, Philadelphia, 1950, J. B. Lippincott Company.

2. Loss of a lateral incisor produces distal shifting of the central incisor and mesial shifting of the canine.
3. Loss of a canine produces distal shifting of the central and lateral incisors. There is seldom mesial shifting of the premolars, although they may rotate.
4. Loss of a first premolar usually results in distal shifting of the canine. There may eventually appear spaces between the central incisors or between the central and lateral incisors. When mesial shifting of the teeth posterior to the first premolar occurs, they are usually also inclined.
5. Loss of a second premolar induces distal shifting of the first premolar, producing a space between the canine and first premolar and mesial shifting of the molars. The first molar may show extreme lingual inclination and loss of occlusal contact.
6. Loss of a first molar produces distal shifting of the premolars and mesial shifting of the second and third molars. In the maxilla the premolars shift in unison. In the mandible the premolars shift singly, creating space between themselves and also distal to the canine. In time, extraction of the first molars in the mandible produces a "flattening" or shortening of the dental arch in the maxilla; in the case of extraction in the mandible the shortening of the arch is produced in the incisor region, increasing the amount of overbite.
7. Loss of a second molar produces mesial inclination and shifting of the third molar.
8. Loss of a third molar does not produce distal shifting of the second molar.

Selenium and Dental Caries. An Investigation Among School Children of Oregon: By Demetrios M. Hadjimarkos, D.D.S., M.S.D., M.P.H., Clara A. Storvick, Ph.D., and LeMar F. Remmert, Ph.D., Corvallis, Ore., Quoted from *J. Pediat.* **40**: 451-455, April, 1952.

". . . with the exception of fluorine, the possible effects of other trace elements, inhibitory or conducive, as an explanation for the variability in caries experience observed among different population groups have not been given enough consideration by research workers.

"The purpose of the present study was an attempt to investigate the possible relationship between minute amounts of the trace element selenium and the wide variations in the degree of susceptibility to caries observed in two groups of school children residing in Oregon. . . . In general, our studies revealed that the children residing west of the Cascade Range showed high rates of caries experience and those east of the mountains low rates. The fluoride content of the public water supplies, availability of dental services, and quantity of candy bars and carbonated beverages consumed by the children were not found responsible for the wide variations in the rates of caries attack observed among the subjects."

In the present study the attempt is made "to ascertain the possible relationship between minute amounts of selenium and the incidence of caries in groups of school children born and reared in two geographic regions of Oregon.

"Selenium has attracted the interest of research workers since it was discovered to be the cause of a serious and oftentimes fatal disease in livestock which is known as 'alkali disease' or selenium poisoning. As a result of extensive investigations, it is believed today that selenium is a normal constitu-

ent of soil and that its concentration depends upon the geological origin of the different soils. In the western states of the country, seleniferous soils have been identified in different regions. In Oregon only one seleniferous area in Malheur county of eastern Oregon has been reported.

"In recent years, Smith and his collaborators conducted two field surveys for the purpose of ascertaining the effects of selenium on people living in known seleniferous areas. In an effort to discover symptoms characteristic of selenium poisoning, members of the families studied were given a physical examination and urine specimens were collected for determination of the selenium content. The results of these investigations revealed that a great percentage of the urine specimens contained selenium in various amounts. It was also found that one of the most pronounced symptoms of disease observed among the families examined was 'bad teeth, varying from marked discoloration through all stages of decay.'

"Whether or not the high incidence of dental caries as well as any of the other most frequently observed symptoms of disease could be considered as specific characteristics of selenium intoxication in man, could not be stated decisively. . . .

". . . Selenium is known to be absorbed from the soil by all vegetation at least in minute amounts, and it is present in detectable amounts in all wheats. . . . The use of insecticides containing selenium compounds has been recognized also as a possible public health hazard.

"The subjects of the present study were white male high-school children who had been born and reared in the counties of Clatsop and Klamath. The reason for selecting subjects from these two counties of the state of Oregon was that in our epidemiological studies on dental caries, we found that the children of Clatsop county showed the highest rates of caries experience (14.4 D.M.F. teeth) and those of Klamath county the lowest rates of caries experience (9.0 D.M.F. teeth).

"Altogether, fifty-three native born and reared school children served as subjects in the present study. Of those, twenty-four were attending the high school of Astoria, county seat of Clatsop county, and twenty-nine were attending the high school of Klamath Falls, county seat of Klamath county. . . .

"Each student was given a Mason jar, one-half gallon capacity, with instructions to take it home and collect during the week-end urine for a twenty-four-hour period.

"In the determination of selenium the method of Klein was used, with minor modifications, for the wet digestions and for the distillations. . . .

"All of the urine specimens analyzed were found to contain selenium in varying amounts. . . . It is apparent from these data that the school children residing in Clatsop county showed higher values than those observed among the subjects living in Klamath county. . . .

"The findings of the present investigation indicate that there is a direct relationship between the degree of susceptibility to dental caries and the urinary selenium concentrations of the subjects. The school children born and reared in Clatsop county have shown high values of urinary selenium concentrations and also high rates of caries attack, whereas among the children of Klamath county the opposite is true.

"The results of our study suggest the possibility that the trace element selenium may render the teeth more susceptible to dental caries attack just as another trace element, fluorine, is known to provide a great deal of protection against dental caries. . . ."

News and Notes

American Board of Orthodontics

The next meeting of the American Board of Orthodontics will be held at the Baker Hotel, Dallas, Texas, April 22 to April 26, 1953. Orthodontists who desire to be certified by the Board may obtain application blanks from the Secretary, Dr. C. Edward Martinek, 661 Fisher Bldg., Detroit 2, Mich. To be considered at the Dallas meeting, all applications must be filed before March 1, 1953.

Northeastern Society of Orthodontists

The next meeting of the Northeastern Society of Orthodontists will be held at the Mount Royal Hotel, Montreal, Canada, on Monday and Tuesday, Nov. 10 and 11, 1952.

Central Section of the American Association of Orthodontists

The 1952 meeting of the Central Section of the American Association of Orthodontists will be held Oct. 13 and 14, 1952, at the Fontenelle Hotel in Omaha, Neb.

Great Lakes Society of Orthodontists

The Great Lakes Society of Orthodontists is holding its twenty-third annual meeting at the Royal York Hotel in Toronto, Ontario, Canada, on Nov. 10, 11, and 12, 1952.

Pacific Coast Society of Orthodontists

Northern Section

The regular meeting was called to order at the University of Washington by Chairman Richard Philbrick May 19.

Arnold Stoller gave a brief report on his coverage at the national meeting of work by Joe Johnson and Oren Oliver.

Lloyd Chapman gave a brief report on his coverage at the national meeting of work done by Allan Brodie and Charles Tweed.

Chairman Philbrick appointed a permanent committee to locate and screen for eligibility prospective associate members from recent graduates or new arrivals in the area. The following shall be notified of their duties: Drs. Craig, Rees, Miller, and the Secretary, Keenan. The Secretary shall always be a member of this board and shall receive reports from the other members so that he may keep a roster.

In the morning session a very comprehensive and excellent "Retention, Class II, Division 1" Symposium was held by the following:

Al Moore. Growth Factors.
E. Fraser. Equilibration.
E. A. Bishop. Tooth Size Discrepancies.
McGovern. Forces Outside the Denture.
Moore. Sex and Age.
P. Lewis. Nonextraction and Extraction.
Fraser. Mechanics of Retention.
Bishop. Fixed and Removable Retainers.
Lewis. Occipital Retention.

Al Moore spoke on the methods of accepting patients for orthodontic treatment as used by the university.

At the afternoon session Dr. Richard Reidel read a very much appreciated and comprehensive paper on "Root Resorption." In addition to a splendid résumé of prominent authori-

ties, he gave some figures of his own from the university work on percentages of resorption from treated and untreated cases with reference to age and sex.

The following were present: Al Moore, Clark, McCulloch, Keenan, Cottingham, Cline, Fraser, McGovern, Lewis, Bishop, Tucker, Hice, Stoller, Philbrick, Maxon, Kahn, MacEwan, H. Moore, McNair, Willis, Butori, Desposato, Kemp, Chapman, Gothenquist, Empenger, Reidel, Phillips, Hammond, and Takano.

JAMES M. KEENAN, SECRETARY.

Central Section

The quarterly meeting was held Tuesday, June 10, 1952, at 7:00 P.M. at the Alexander Hamilton Hotel.

The meeting was called to order by Chairman Charles W. Konigsberg who turned it over to Program Chairman Ray Curtner who introduced the speaker, Theodore S. Martin of Los Angeles.

His subject was "The Activator—Its Construction and Uses." Sixty members and guests were present and Ted's paper was most interesting and covered the work of several years of both clinical and laboratory technique.

At the conclusion of his session, Ray Curtner thanked the speaker for his excellent paper and the meeting was turned back to Chairman Konigsberg, followed by a short business session.

Fred West suggested that we hold in abeyance the appointment of a committee pertaining to the Crippled Children's work in San Francisco until we have been asked directly by the officials of the Crippled Children's Services to participate in their program.

Ernest Johnson explained the functions and future plans of the American Board of Orthodontics of which he is a member.

Reuben Blake was thanked for his very thorough and interesting report as a delegate to the recent convention in St. Louis, and reported on the progress of our coming February meeting.

Southern Section

The meeting was held Friday, June 13, 1952, at the Nikabob Restaurant, Los Angeles.

The following members and guests were present: Members: Forrest Moodie, W. Mahlon Adams, Theodore S. Martin, Robert Gawley, Fred E. McIntosh, Geo. L. Farmer, H. L. Shannon, R. E. Lee, Roscoe Keedy, Dave England, Fay C. Van, Wilbur Bedford, Spencer Atkinson, Walter Furie, Howard Lang, Merle Davis, Calvin Garverick.

Guests: Edward Boyd, Merton Hill, John V. Avakian, J. R. Wittwer, Clark McQuay, J. Clifford Willcox, Robert C. Boyd, Wm. C. Reed, Wm. M. Jow, Edw. L. Corlett, E. S. Sagehorn, Richard S. Hambleton, Ruth Allen.

Chairman: Merle B. Davis, Presiding.

Speaker was Mr. James M. Garrison, Assistant Trust Officer of the Hollywood main office of the Bank of America. Subject: "Estate Planning."

We felt that this was a meeting that could be recommended to other sections.

Following this was the business meeting.

The following members were unanimously recommended to membership:

C. F. Mitchell, D.D.S., Whittier.

J. Clifford Willcox, D.D.S., Pasadena.

Merton E. Hill, D.D.S., Fullerton.

John V. Avakian, D.D.S., Inglewood.

George N. Boone, D.D.S., Los Angeles.

Southwestern Society of Orthodontists

The annual meeting of the Southwestern Society of Orthodontists will be held in San Antonio, Texas, from October 26 to October 29, inclusive.

Headquarters for the meeting will be at the Gunter Hotel.

Tufts College Dental School

Tufts College Dental School, of Boston, Mass., will provide a course in orthodontics on each Wednesday for eight weeks, October and November, 1952, and in applied cephalographics in December, 1952.

HERBERT MARGOLIS AND STAFF.

Universitiy of Pennsylvania

The Thomas W. Evans Museum and Dental Institute of the School of Dentistry, University of Pennsylvania, Philadelphia, Pa., will give a postgraduate course on the philosophy and principles of the Universal appliance. The course will be conducted by Spencer R. Atkinson from April 13 to 18, 1953.

A course on the twin wire mechanism will be given by Joseph E. Johnson, April 6 to 10, 1953, at the University of Pennsylvania.

European Orthodontic Society

The program of the twenty-eighth meeting, at the Kurhaus Hotel, Scheveningen, Holland, July 14-17, 1952, follows.

Officers

President:	J. A. C. Duyzings, Utrecht.
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Honorary Co-Editor:	Russell Logan, Edinburgh.

July 14

Official reception for all members by the Netherlands Government and Municipality of The Hague.

July 15

Ladies' program. All-day tour.

Sunday, July 13

All-day tour by motor coaches to the picturesque fishing-village of Volendam.

Monday, July 14

Mr. J. A. C. Duyzings, Utrecht, Holland. Views on "Early Treatment."

Prof. Dr. J. Dankmeijer, Leiden, Holland. Modern Embryology and Orthodontics. Le rôle de l'embryologie moderne dans l'orthodontie.

Prof. J. W. Tjebbes, Utrecht, Holland. The Influence of Surgical Treatment of Cleft Palates on the Dental Arch.

Discussion.

Prof. Dr. med. Rud. Hotz, Zürich, Switzerland. Prerequisites and Indications for Early Treatment.

Dr. P. Liskenne, Beausoleil A.M., France. Considérations sur les traitements précoces; indications et choix des thérapeutiques.

Mr. W. J. Tulley, London, England. The Problem of Etiology.

Prof. Dr. C. M. Seipel, Malmö, Sweden. Developmental Disturbances and Malocclusion Produced by Experimental Hormone Treatment in Monkeys.

Tuesday, July 15

Mr. W. Grossmann, London, England. Early Orthodontic Treatment.

Discussion.

Dr. P. L. Rousseau, Angers, France. Contribution à l'étude du Traitement précoce en Orthopédie dento-faciale.

Discussion.

Dr. Kaare Reitan, Oslo, Norway. Tissue Changes Following Experimental Tooth Movement as Related to the Time Factor.

Wednesday, July 16

Dr. C. F. A. Moorrees, Boston, U.S.A. Some Aspects of Growth and Developmental Changes in the Dentition.

Synopsis: A report on longitudinal growth studies at the Forsyth Dental Infirmary (Boston, Mass., U.S.A.).

Dr. Allan G. Brodie, Chicago, U.S.A. Principles of Treatment on the Edge-Wise Philosophy and Appliances.

Dr. Andrew F. Jackson, Philadelphia, U.S.A.

Orthodontics: Its Nature, Objectives, and Therapy From the Basis of Infinite Variation.

Synopsis: A direct comprehensive method of evaluating factors and dealing with clinical problems by employing principles of treatment of universal application in which a wide variety of appliances find the conditions best suited for their specific usefulness.

Illustrated with a large number of Kodachrome slides showing a wide range of case histories which were treated from the standoint of this basic philosophy.

Mr. Ch. F. L. Nord, Amsterdam, Holland, Habits Versus Heredity.

Discussion.

Professor E. Muzj, Dr. G. Maj, Dr. C. Luzj, and Dr. B. Miotti, Rome, Italy. Recent Studies of the Variability of the Angular Correlations of the Various Parts of the Carnio Skeleton and Their Applications in Diagnosis.

Dr. Lucien De Coster, Brussels, Belgium. Research on Investigations of the Familiar Facial Pattern in Orthodontic Prognosis.

Thursday, July 17

Demonstrations and films.

Demonstrations will take place between 9:00 and 1:00.

Each demonstration will be limited to 20 minutes for the table clinics.

Dr. George M. Anderson, Baltimore, U.S.A. Efficiency in the Planning, Construction, and Adjustment of Appliances.

Brief outline: A great deal may be accomplished with very little mechanical aid. Simplicity of design means ease of operation benefiting both patient and operator.

Dr. H. C. Berendt, Jerusalem, Israel. An Orthodontist Looks at Portraits of Art.

Brief outline: 20 photographic enlargements of deformities of the jaws, from the History of Art.

Mr. C. Bertram, Den Haag, Holland. Causes of Impacted Teeth and Results of Treatment.

Dr. Saul M. Bien, New York, U.S.A. Orthodontic Procedures in the Treatment of Periodontal Disease.

Dr. Sydney W. Bradley, Ottawa, Canada. Some Cases, Treated With the Edgewise Arch Mechanism.

Dr. Allan G. Brodie, Chicago, U.S.A. The Edgewise Arch Mechanism.

Mr. Harold Chapman, London, England. Treatment of Prenormal Occlusion in Very Young and Older Children.

Brief outline: Models, head and chin-caps and plate.

Dr. Lucien De Coster, Brussels, Belgium. A New Line of Reference of Sagittal Tele-Radiographs.

Brief outline: Presentation of sagittal teleradiographs of the same individual by superposition of a new line of reference.

Mr. J. M. M. Crefcoeur, Maastricht, Holland. Removable Appliances With Universal Possibilities.

Dr. Sylvain Dreyfus, Lausanne, Switzerland. Nouvelle technique pour la confection rapide de plaques acryliques.

Mr. J. A. C. Duyzings, Utrecht, Holland. Orthodontic Frame Plates.

Mr. Alexis W. Eastwood, London, England. A Preliminary Report of Treated Cases Using Cephalometric Analysis of Before and After Headplates.

Dr. S. Fastlicht, Mexico City, Mexico. Some Universal Appliances for Early Treatment.

Brief outline: Lingual and labial arches; split lingual expansion arch; all constructed in chrome alloy.

Mr. G. M. Fitzgerald, Dublin, Eire. Treated Cases.

Brief outline: A series of models showing result of treatment "before" and "after." (Some with extractions.)

Miss F. L. Franks, Sawclose, England. Some Cases of Supernumerary and Geminated Deciduous Teeth.

Mr. W. Grossmann and Miss Jean Brown, London, England. Records of Early Orthodontic Treatment.

Brief outline: Models and photographs and x-ray profiles of young children and treatment results.

Prof. Dr. Oscar Hoffer, Milan, Italy. Structural Modifications of Palatal Vault With Removable Appliances.

Brief outline: Exhibition of a series of models and pictures.

Prof. Dr. Rud. Hotz, Dr. G. Antonini, Zürich, Switzerland. Early Functional Treatment.

Dr. Andrew T. Jackson, Philadelphia, U.S.A. Orthodontics, Its Nature, Objectives, and Therapy From the Basis of Infinite Variation.

Dr. Birger Kjellgren, Stockholm, Sweden. Bite Conditions and Treatment in Cases of Cleido-Cranial Dysostosis.

Prof. Dr. G. H. R. von Koenigswald, Utrecht, Holland. Demonstration of the Reconstruction of a Few Fossil Jaws.

Dr. Francis J. Loughlin, Jamaica, N. Y., U.S.A. Stone-Base Plastic Teeth Study Models.

Mr. J. Murck-Jansen, Rotterdam, Holland. Demonstration of Speech Appliances for Cleft Palate Patients.

Prof. Edmondo Muzj, Rome, Italy. La Thérapie Orthopédique fonctionnelle démontrée par Dessins Mobiles.

Film demonstration.

Dr. Leopold Petrik, Vienna, Austria. Behandlungserfolge mit dem Aktivator.

Brief outline: Demonstration des aktivators und seiner hilfsmittel.

Vorweisung von mit dem aktivator behandelter fälle.

Dr. Pedro Planas, Madrid, Spain. Nuestros Aparatos dilatadores y Semi-Funcionales.

Dr. A. Thornton Taylor, Sydney, Australia. 1. The Use of the Tube Spring Appliance as an Anchorage Component or an Active Appliance. 2. Multiple Flasking of Acrylic Appliances.

Dr. E. A. Tisdale, Boston. A Simple Procedure for Early Treatment.

Brief outline: Fixed appliances giving desired bodily movement and requiring minimum adjustment.

Dr. R. Villain, Nice, France. Rôle des fromes cliniques dans l'evolution de l'orthodontie.

Mr. K. G. Wongtschowski, London, England. Atypical Extraction.

Brief outline: Cases, in which extraction of incisors, canines, and six-year molars will seem the appropriate therapeutic approach.

Seminar for the Study and Practice of Dental Medicine

Two hundred dentists, including top dental-medical researchers, will be in attendance at the Ninth Annual Seminar for the Study and Practice of Dental Medicine set for the Desert Inn, Palm Springs, Calif., Oct. 26 through Oct. 30, 1952.

Advance registration, according to an announcement by Dr. Hermann Becks, President and Founder of the Seminar, indicates a capacity turnout for the five-day study session.

Navy Mobile Dental Clinic Now Operating in Korea

Now operating in Korea a Navy Mobile Dental Clinic provides front line dental care to Leathernecks of the First Marine Division. This treatment, rendered wherever the Mobile Clinic sets up shop, is supplemental to that received at stationary dental clinics of the division.

The Mobile Dental Clinic consists of three truck units, three trailers, three dental officers, five dental technicians, and the necessary supplies and equipment. It makes scheduled visits to all elements of the First Marine Division near the front lines or wherever they are bivouacked. This saves the manpower loss previously experienced when dental patients had to be transported to rear area dental clinics for necessary treatment.

Mobile Marine Dental Unit. Front line troops of the First Marine Division undergo dental inspection and repair work every six months, thanks to the mobile "dentist's office" which operates on a regular schedule throughout the division. It houses two complete dentist chairs and is electrically equipped throughout. A trailer power unit supplies electricity.

It is a self-contained electrically operated unit. Each truck unit tows a trailer; one contains housing equipment, records, spare parts, and the necessary dental supplies, another a water tank, and the other the electric generator to supply power for the Clinic.

The two truck units containing dental chairs, instrument cabinets, etc., were designed by dental officers of the First Marine Division. The construction and fabrication of the units was by the Engineer Batallion of the Division. The third truck unit, a field prosthetic mobile laboratory, was obtained from the United States Army. The Mobile Dental Clinic first operated under the supervision of Captain Francis C. Snyder, United States Navy Dental Corps.

Announcement to Future Essayists

At the annual session of the American Association of Orthodontists in Louisville the following recommendations of the Publication and Editorial Board were adopted and are now official:

1. That many valuable articles are lost for publication because they were not prepared for such.
2. Authors expecting to have published, without expense, a profusion of illustrations impose a difficult task upon the editorial staff.
3. That the A.A.O. should adopt official instructions for essayists, including all constituent societies, as to the manner in which their manuscripts should be prepared for publication first and for presentation second.

The contract between the American Association of Orthodontists and The C. V. Mosby Company includes a stipulated sum to be spent for the illustrations of acceptable articles for publication. Any excesses of this budget must be paid out of the treasury of the A.A.O. and may become dangerously expensive.

Accordingly the A.A.O. passed a resolution in 1949 limiting the cost of illustrating any one article appearing in the JOURNAL. In the exercise of these instructions, the Editorial Staff of the JOURNAL has been most lenient and considerate, but the budget must be held within its limit. Excess costs of illustrations may be paid by the authors or other outside sources, if desired.

Avoid delay in the publication of your essay by limiting illustrations.

GEORGE R. MOORE, Secretary-Treasurer, A.A.O.
S. J. KLOEHN, Chairman, Publication and Editorial Board, A.A.O.

Seven New Permanent Army Hospitals to Provide Capacity for 3,200 Patients

Construction of the first of seven new permanent type hospitals planned for Army posts in this country will begin early next year, the Department of the Army announced today. The new buildings will provide capacity for a minimum of 3,200 patients.

The hospitals represent the first step in the Army's program to transfer patients from wooden, cantonment type structures built during World War II to modern multistory structures, according to Major General George E. Armstrong, MC, the Army Surgeon General.

Hospitals to be constructed at Fort Benning, Ga., Fort Bragg, N. C., Fort Knox, Ky., and Fort Riley, Kan., are for 500 beds on a 1,000-bed chassis. A new installation at Fort Belvoir, Va., will provide 250 beds initially, expansible to 500, while Fort Monmouth, N. J., will receive a 200-bed facility constructed on a 300-bed chassis. The largest structure will be erected at Fort Dix, N. J., and will furnish 750 beds, expansible to 1,000 beds.

The new hospitals are the first to be built by the Army in which increased bed capacity may be quickly obtained during emergencies without additional construction of clinical and administrative facilities. This readily accessible emergency expansion represents a reserve for the care of increased numbers of patients in a possible future mobilization.

Modern in design, the new installations will have a reinforced concrete frame and will embody the latest advances in medical and surgical diagnostic and treatment facilities. Hospitals providing 500 beds or more initially will be nine stories high.

Emphasis throughout the new facilities will be on improved patient care, General Armstrong said. Plans prepared by leading civilian and military authorities in the hospital design field have reduced to a minimum the number of luxuries and "extras" while conserving steel and other scarce building materials.

The Surgeon General declared that the new facilities incorporate the findings of extensive research in hospital management conducted by the Army Medical Service for the past three years at Valley Forge Army Hospital, Phoenixville, Pa., and at other major hospitals. These new features are expected to economize in the use of nurses, ward technicians, and other scarce personnel, General Armstrong asserted.

Wards for the critically ill, operating rooms, and clinic facilities will be air-conditioned. The operating rooms will also be equipped to eliminate the danger of anesthetic explosions.

All clinics in the new hospitals, including diagnostic and laboratory facilities and outpatient services, will be centralized on the ground floor to curb unnecessary traffic through other parts of the building. Besides providing complete inpatient and outpatient care, the new facilities will offer a wide range of consultation and preventive medicine services.

Construction of each new hospital will be begun under a priority system set up by the Department of the Army. All units are expected to be completed in from two to three years.

Retiring Air Force Dental Chief Receives Additional Award

Major General George R. Kennebeck, United States Air Force, who retired from active duty June 30, was awarded an Oak Leaf Cluster to his Legion of Merit Medal during a noon ceremony in the Pentagon, by Lieutenant General Laurence S. Kuter, Deputy Chief of Staff for Personnel, USAF.

At the time of his retirement General Kennebeck was Assistant for Dental Service in the Office of the Surgeon General, United States Air Force.

Major General George R. Kennebeck, USAF (DC) stands alongside the oil portrait of himself presented by officers of the Air Force Dental Service upon his retirement as dental chief for the United States Air Force. The presentation was made by Major General Harry G. Armstrong, USAF Surgeon General, at a formal dinner held in General Kennebeck's honor. The painting was executed by Mr. Thomas E. Stephens, well-known portrait artist from New York.

The citation which accompanied the award lauded General Kennebeck for inaugurating "several remarkably successful programs which permitted the rendering of excellent dental service to all Air Force personnel by a minimum number of dental officers. This was accomplished during a period in which the strength of the Air Force quadrupled."

General Kennebeck retired at the age of 60 after almost thirty-five years of military service. Present at the ceremony were his wife, his son, George, Jr., a cadet at the United States Military Academy at West Point, and his mother-in-law, Mrs. M. L. Scales.

The General and his wife will continue to reside at their home in Silver Springs, Md.

Notes of Interest

Dr. Arthur Raeder announces that he is the successor of the late Dr. Leonard Kohn and will limit his practice to orthodontics at 615 Eastern Parkway, Brooklyn 16, N. Y.

Gerald P. Copeland, D.D.S., M.Sc., announces the opening of an office at 67 Elm St., East, Sudbury, Ontario, Canada, practice limited to orthodontics.

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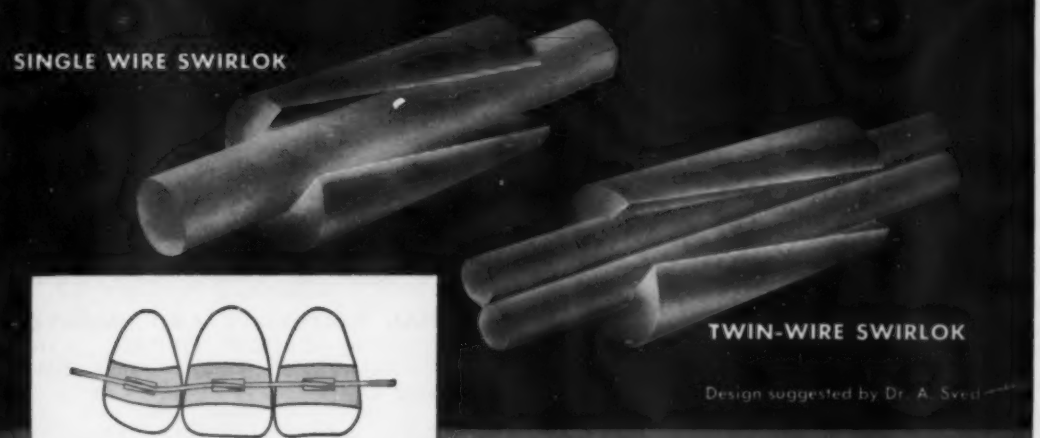

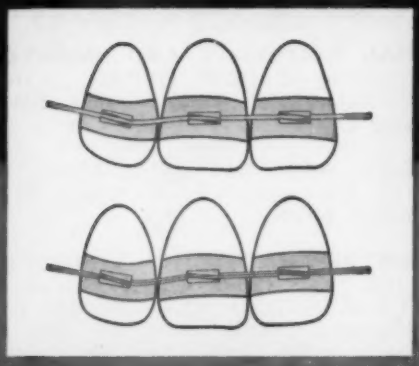

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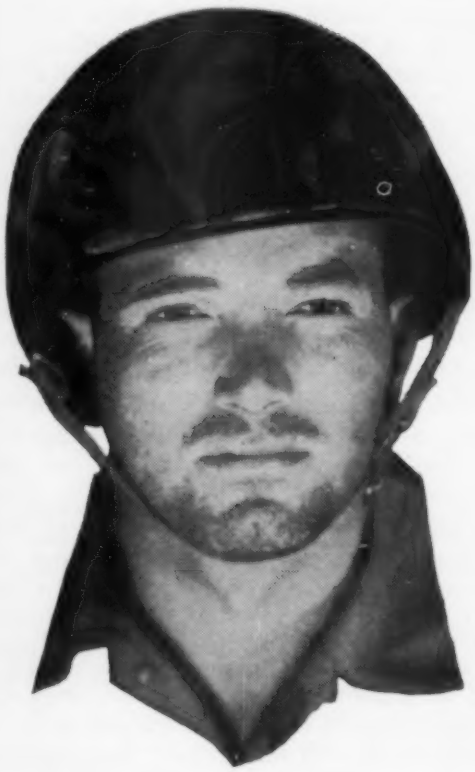

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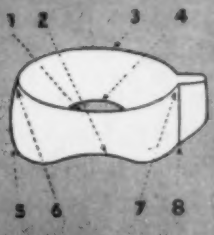

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